

1 Introduction

Saint-Gobain Containers, Inc. (SGCI) operates a glass container manufacturing facility located in Dolton, Illinois (see Figure 1). The facility (I.D. No. 031069AAI) is authorized to operate under CAAPP Permit No. 95090177, issued on June 26, 2001, by the Illinois Environmental Protection Agency (IEPA), as a major source of nitrogen oxides (NO_x), carbon monoxide (CO), sulfur dioxide (SO₂), and particulate matter (PM). The Dolton plant is located in Cook County, which is designated as attainment with the National Ambient Air Quality Standards (NAAQS) for all pollutants except for ozone (moderate nonattainment for the 8-hour standard) and fine particulate matter known also as PM_{2.5} (nonattainment with the 24-hour standard). The facility is an existing major source under Prevention of Significant Deterioration (PSD) permitting requirements, since emissions of at least one attainment pollutant exceed the PSD major source threshold. It is also a major source under Nonattainment New Source Review (NNSR) permitting requirements for ozone and for PM_{2.5}.

SGCI is submitting this application for a construction permit according to the requirements in 35 Illinois Administrative Code (IAC) 201.152 to authorize the upcoming modification of Furnaces #1, #2, and #3 at the Dolton facility. The proposed project will include the installation of emission controls including a dry scrubber, electrostatic precipitator (ESP), and selective catalytic reduction (SCR) to control SO₂, PM, and NO_x emissions, respectively, from the Furnaces. At this time SGCI is considering the use of an integrated ceramic filter system (ceramic filter technology with upstream alkali injection) to achieve SO₂, PM, and NO_x emission reductions in lieu of the dry scrubber, ESP, and SCR represented in this application. SGCI recently received approval for the use of alternative technology from USEPA Region V (a copy of the approval letter is located in Appendix C). If an alternative technology is chosen, then SGCI will amend this application with the new control equipment information and any revisions to process monitoring parameters that are needed. A change in the proposed emission control technology would not affect the post-project emission rates as they are currently described.

In addition to the installation of controls, the project will include rebuilds of Furnaces #1 and #3 and the delimiting of the existing production capacity limit placed on Furnace #2. As a result of this project, Furnace #1 will increase in capacity from 255 tpd to 383 tpd. The design capacity of Furnace #2 will not be increased, however SGCI is requesting the removal of the capacity limit previously imposed on Furnace #2 under permit 11100030, issued May 7, 2012. Furnace #3 will remain at the current design capacity. The increase in emissions related to the project will be below the levels triggering NNSR or PSD permitting requirements.

SGCI entered into a global consent decree with USEPA and several states, including Illinois, which was entered by the United States District Court for the Western District of Washington at Seattle on May 7, 2010 (the "GCD"). SGCI also seeks to incorporate certain requirements and limitations enumerated in the GCD for Furnaces #1, #2, and #3 into the construction permit issued for this project. Under the GCD, SGCI is required to operate the proposed dry scrubber, ESP, and SCR or alternative emission controls no later than December 31, 2014.

2 Facility and Source Description

The Dolton facility is a glass manufacturing plant with three regenerative, natural gas-fired glass melting furnaces. A process flow diagram for the furnace operations is included in Figure 2.

Raw materials, including silica (sand), limestone, soda ash, cullet (recycled glass), and lesser quantities of refining agents, colorants, and decolorizers are received at the site and unloaded into the material handling system. Generally, the aggregate raw materials are first transferred to a receiving hopper and then sent to storage silos via a bucket elevator. Cullet is obtained both on-site from recycled scrap and off-site from third party recycling centers and other similar sources. From the storage silos, the raw materials are transferred through a gravity feed system to a weigh hopper before being combined according to the batch specification in a mixer, thoroughly mixed, and conveyed to storage bins above the furnace. The combined material is then continuously fed into the furnaces via the furnace feeders. The raw material feed operation is automated such that a preset level of molten glass is maintained in the furnaces.

In the Furnace melters, the raw materials are melted into molten glass. Heat to maintain the glass in a molten state is supplied by natural gas and submerged electrodes (electric boost). The Dolton Furnaces are each a regenerative type, where the furnace firing occurs in cycles in order to recover waste heat. During the first cycle, the furnace exhaust is routed through a set of regenerator chambers lined with checker bricks on one side of the furnace. The bricks recover residual heat from the furnace exhaust. During the second phase, the exhaust flow is reversed and the incoming combustion air is passed through the heated regenerator chambers so it is pre-heated before entering the melter. During each cycle, the exhaust gases are routed to a stack which emits to the atmosphere. Each Furnace currently vents through two stacks (one for each firing cycle), but as a result of this project the three furnace exhausts will be combined and routed through the planned emission controls prior to discharge through a single stack.

As raw material enters each furnace melter, it floats on top of the molten glass already in the furnace. The material subsequently melts into molten glass, and is refined (removal of trapped gases and bubbles) and homogenized within the melter. Nearly bubble-free molten glass is continually withdrawn from each furnace into the distributor and then flows through shallow refractory channels called forehearths, each of which leads to one of the two individual glass container production lines, or "shops", associated with each of the furnaces (Shops #11 and #12, #21 and #22, and #31 and #32, respectively). The distributor and forehearths are natural gas-fired to provide heat conditioning and temperature control of the molten glass during transfer.

From each forehearth, the glass is cut into sections (gobs) by a set of shears. The gobs enter the Individual Section (IS) glass forming machines, where each gob is formed into a glass container within a mold. A mold swabbing compound is applied to the mold surface to keep the glass from sticking. After the containers are formed and released from the molds, they are conveyed to an exterior coating operation (hot end coating), where an organotin compound is applied to the container exteriors to strengthen the glass and prevent abrasions. The containers

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are then conveyed through natural gas-fired annealing lehrs (one for each shop), which reheat the containers slightly then cool them at a controlled rate. This process removes unwanted stress created in the forming process and promotes container strength.

Once cooled, the containers are inspected, packed, and shipped to customers. Damaged or off-spec containers are transferred to the batch plant to be recycled back into the process as cullet after crushing.

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3.5 GCD Requirement Incorporation

As mentioned in Section 1, SGCI entered into a GCD on May 7, 2010. Whenever SGCI is required to obtain a Permit for the purpose of complying with the GCD, the GCD specifies that the permitting agency shall "...include in the Permit for the installation of control devices, monitoring devices and the contemporaneous Furnace rebuild project the emission controls, emission limits, averaging periods, monitoring requirements, compliance determination, and compliance schedule set forth..." in the GCD [GCD, Section VIII.30]. Since the proposed project will trigger certain requirements and limitations enumerated in the GCD, SGCI requests that these requirements and limitations be incorporated into the construction permit and operating permit issued for this project.

Pursuant to these GCD provisions, Section 6 of this application provides a listing of the permit conditions SGCI proposes to satisfy the requirements of the GCD that apply to the Dolton Furnaces.

4 Project Emissions

Because the proposed project involves the modification of the Dolton Furnaces and associated emission units as well as the addition of new emission units (the emergency generator, the soda ash silo and the ESP dust silo), the resulting changes in emissions were estimated to determine the project emissions increases and to confirm that the PSD and NNSR permitting requirements are not applicable. A summary of the project emissions increase for each pollutant is provided in Table 1. Detailed emission estimates and a compilation of the emission factors used to calculate emissions are provided in Appendix B.

Baseline Actual Emissions of pollutants that are regulated under PSD (CO, PM, PM₁₀, H₂SO₄ mist, and GHG) and Past Actual Emissions of pollutants that are regulated under NNSR (NO_x, PM_{2.5}, SO₂ as a PM_{2.5} precursor, and VOM) were calculated using the facility's average annual production rates (tons pulled) during the 24-month period from January 2010 through December 2011. The Baseline Actual/Past Actual emission calculations are provided on page 13 of Appendix B. Furnace emissions were determined using the applicable glass pull rate, combined with emission factors either developed from stack testing data or taken from AP-42, as described below.

Pollutant	Pre-project Furnace Emission Factor Basis
PM / PM ₁₀ / PM _{2.5}	Emission factors for filterable PM (FPM) are based on the stack tests performed at each Furnace prior to or during the baseline period (tests conducted 09/2009 and 07/2011). To derive a single FPM factor for each Furnace, the factors from the stack tests are weighted based on the relative glass throughput during the period of time over the project baseline when each factor was in effect. Total PM (TPM) factor assumes that condensable PM (CPM) is 18.7% of TPM, based on 2010-2011 compliance test results for the group of similar regenerative furnaces across SCGI's fleet (producing Flint or Georgia Green glass and using 20% - 40% cullet). All CPM is assumed to be PM ₁₀ and PM _{2.5} . PM ₁₀ and PM _{2.5} factors also assume that 95% of FPM is FPM ₁₀ and 91% of FPM is FPM _{2.5} , consistent with AP-42 Table 11.15-3 for an uncontrolled furnace.
SO ₂	Emission factors are based on the stack tests performed at each Furnace during the baseline period (tests conducted 09/2009 and 07/2011). To derive a single factor for each Furnace, the factors from the stack tests are weighted based on the relative glass throughput during the period of time over the project baseline when each factor was in effect.
NO _x	Furnace #1 emission factor is based on compliance testing performed 06/2008, since subsequent NO _x testing has not been performed. The Furnace #2 and #3 NO _x emission factors are based on the stack tests performed at each Furnace prior to or during the baseline period (tests conducted 09/2009 and 07/2011). To derive a single factor for each Furnace, the factors from the stack tests are weighted based on the relative glass throughput during the period of time over the project baseline when each factor was in effect.
H ₂ SO ₄ mist	Emission factor is derived from the average of stack testing results for the group of similar regenerative Furnaces across SCGI's fleet (producing Flint or Georgia Green glass) over the 2010 - 2011 timeframe.
VOM, CO	Emission factors per AP-42, Section 11.15, Table 11.15-2, 10/86.

Baseline Actual/Past Actual emissions from the associated distributor, forehearth, and lehrs were estimated from fuel usage data and published AP-42 emission factors for natural gas

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combustion (Tables 1.4-1 and 1.4-2). Baseline Actual/Past Actual emissions from mold swabbing, hot end coating, material handling, and the batch mixers were estimated based on the past material consumption data and emission factors for these operations.

Future Projected Actual Emissions of pollutants that are regulated under PSD and Future Permitted Emissions of pollutants that are regulated under NNSR were calculated based on Furnace #1 increasing its design capacity by 50% and Furnace #2 and Furnace #3 operating without a change to their current design capacities. The Future Projected Actual/Future Permitted emission calculations are provided on page 14 of Appendix B. Furnace emissions were determined using the applicable glass pull rate, combined with the emission factors reflecting the ESP, dry scrubber, and SCR controls as described below.

Pollutant	Post-project Furnace Emission Factor Basis
PM / PM ₁₀ / PM _{2.5}	Post-project emission factors for FPM from each Furnace are based on the GCD limit [IV.9.c]. TPM factor assumes that CPM is 31% of TPM for Furnace #1, 39.4% of TPM for Furnace #2, and 33.3% of TPM for Furnace #3, conservatively assuming that CPM emissions remain unchanged from the results of the most recent stack tests. PM ₁₀ and PM _{2.5} factors also assume that 75% of FPM is FPM ₁₀ and 53% of FPM is FPM _{2.5} , consistent with AP-42 Table 11.15-3 for an ESP-controlled furnace.
SO ₂	Post-project emission factors are based on the GCD limit of 50 ppm (for a pre-control SO ₂ concentration less than 167 ppmv) and on the expected performance of the dry scrubber to be installed as part of the proposed project, based on the inlet SO ₂ concentrations at each Furnace taken from the most recent stack test results.
NO _x	As specified by GCD, IV.7.d.ii.
H ₂ SO ₄ mist	Post-project emission factor is based on recent stack testing results of other SGCI furnaces with SO ₂ controls while accounting for expected variability of furnace operation.
VOM, CO	Emission factors per AP-42, Section 11.15, Table 11.15-2, 10/86.

Future Projected Actual/Future Permitted emissions from the associated distributor, forehearth, and lehrs were estimated from the post-project natural gas use (increased from their baseline rates in proportion to the increase in pre- to post-project furnace production) and published AP-42 emission factors for natural gas combustion (Tables 1.4-1 and 1.4-2). Future Projected Actual/Future Permitted emissions from mold swabbing, hot end coating, material handling, and the batch mixers were estimated based on the post-project material consumption (also increased from their baseline rates in proportion to the increase in pre- to post-project furnace production) and the respective emission factors for these operations.

Future Projected Actual/Future Permitted emissions of particulate were calculated for the proposed scrubber silo and ESP dust silo using emission factors from AP-42, Table 11.26-1 for storage bin loading. The emission estimates conservatively assume that PM₁₀ and PM_{2.5} emissions are equivalent to total PM emissions. The material throughput for the soda ash reagent stored in the scrubber silo assumes that the reagent will be injected at a level 50% greater than the stoichiometrically required amount for the expected pre-control SO₂ emissions. The material throughput for the ESP dust silo conservatively assumes that the entire amount of

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sodium sulfate formed in the dry scrubber and excess soda ash reagent injected into the dry scrubber will be removed by the ESP in addition to the Furnace PM emissions.

Future Projected Actual/Future Permitted emissions for the proposed emergency generator were calculated based on an annual operating time of 500 hr/yr according to guidance provided by USEPA ("Calculating Potential to Emit for Emergency Generators" (September 6, 1995). PM, NO_x, and CO emissions were calculated using factors corresponding to the allowable limits for Tier 2 engines at 40 CFR 60.4202(a)(2). NO_x emissions conservatively assume that the NO_x emission factor is equal to the non-methane hydrocarbon plus NO_x Tier 2 limit, and the VOM factor is based on the Tier 1 allowable limit for total hydrocarbons.

Exhibit 270-1
 Applicable Rules Summary - Emergency Generator
 Saint-Gobain Containers, Inc.
 Dolton, Illinois

Emissions Standards or Limitations Applicable to the Emission Unit

<i>Regulated Air Pollutant(s)</i>	<i>Emission Standard(s)</i>	<i>Requirement(s)</i>
NOx, PM, CO, VOM, SO ₂	40 CFR 60.4205(b)	Meet the applicable emission standards of 40 CFR 89.112 and 89.113 as follows: PM: 0.20 g/kW-hr, CO: 3.5 g/kW-hr; NOx + NMHC: 6.4 g/kW-hr; opacity: 20% during acceleration mode, 15% during lugging mode, 50% during peaks in either acceleration or lugging mode
NOx, PM, CO, VOM, SO ₂	40 CFR 60.4207(a) and (b)	Use diesel fuel certified to the standards in 40 CFR 80.510(b)
NOx, PM, CO, VOM, SO ₂	40 CFR 60.4211(a); 40 CFR 60.4206	Operate and maintain the engine according to manufacturer's written instructions or procedures developed by the owner or operator that are approved by the engine manufacturer over the life of the engine; only change those settings that are permitted by the manufacturer.
NOx, PM, CO, VOM, SO ₂	40 CFR 60.4211(c)	Comply with emission standards by purchasing a certified engine. Install and configure the engine according to the manufacturer's specifications
NOx, PM, CO, VOM, SO ₂	40 CFR 60.4211(e)	Maintenance checks and readiness testing limited to 100 hours per year; No limit on the use of the engine in emergency situations.
HAPs	40 CFR 63.6590(c)	For new stationary RICE located at an area source of HAP, meet MACT Subpart ZZZZ requirements by meeting the requirements of 40 CFR 60 Subpart IIII. No further requirements under Subpart ZZZZ apply.

Recordkeeping Rules Applicable to the Emission Unit

<i>Regulated Air Pollutant(s)</i>	<i>Recordkeeping Rule(s)</i>	<i>Requirement(s)</i>
N/A		

Reporting Rules Applicable to the Emission Unit

<i>Regulated Air Pollutant(s)</i>	<i>Reporting Rule(s)</i>	<i>Requirement(s)</i>
N/A		

Monitoring Rules Applicable to the Emission Unit

<i>Regulated Air Pollutant(s)</i>	<i>Monitoring Rule(s)</i>	<i>Requirement(s)</i>
NOx, PM, CO, VOM, SO ₂	40 CFR 60.4209(a)	Install a non-resettable hour meter prior to startup of the engine


Testing Rules Applicable to the Emission Unit

<i>Regulated Air Pollutant(s)</i>	<i>Testing Rule(s)</i>	<i>Requirement(s)</i>
N/A		

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Appendix B
Emission Estimates

ENVIRON

		Saint-Gobain Containers, Inc. Dolton Furnace #1 & #2 & #3 Modifications PSD/NNSR Applicability Analysis			
Signature: MMW Checked by: JGB/BED		Date Calc Made Final: 9/13/2012 Page: 1			
Pollutant	Project-Related Emissions Increase (tpy)	PSD/NNSR Significance Threshold (tpy)	Netting Analysis Required? (yes/no)	Net Emissions Increase/Decrease (tpy)	Major Modification? (yes/no)
PM	10.69	25	NO	NA	NO
PM ₁₀	9.11	15	NO	NA	NO
NO ₂ ¹	9.85	40	NO	NA	NO
CO	20.43	100	NO	NA	NO
H ₂ SO ₄ Mist	0.00	7	NO	NA	NO
CO ₂ e ²	47,236	75,000	NO	NA	NO
GHG ²	47,199	0	NO	NA	NO
NO _x	9.85	40	NO	NA	NO
VOM	13.88	40	NO	NA	NO
SO ₂	1.60	40	NO	NA	NO
PM _{2.5}	9.08	10	NO	NA	NO

Notes:

¹ The review for NO₂ is performed using total NO_x, which provides a conservative analysis. NO₂ is anticipated to be a small fraction of NO_x.

² For GHG and CO₂e emissions, netting is only required if both CO₂e and GHG emissions are greater than the applicable threshold.

<div style="display: flex; justify-content: space-between;"> ENVIRON Saint-Gobain Containers, Inc. Dolton Furnace #1 & #2 & #3 Modifications Project-Related PM Emission Changes </div>			
Signature: <i>MMW</i> Checked by: <i>JGB/BED</i>		Date Calc Made Final: 9/13/2012 Page: 2	
Source	Baseline or Past Actual Emissions (tpy) ¹	Post-Project Emissions (tpy) ^{2,3}	Project-Related Emissions Increase/Decrease (tpy) ⁴
Furnace No. 1	18.74	20.27	1.53
Furnace No. 2	18.54	16.85	-1.67
Furnace No. 3	21.28	14.78	-6.50
Distributors/Forehearth - #1	0.28	0.54	0.26
Distributors/Forehearth - #2	0.24	0.38	0.13
Distributors/Forehearth - #3	0.27	0.36	0.10
Material Handling	0.01	0.02	0.01
Lehrs - Furnace #1	0.03	0.06	0.03
Lehrs - Furnace #2	0.03	0.05	0.02
Lehrs - Furnace #3	0.04	0.05	0.01
Mold Swab - Furnace #1	3.90	7.43	3.53
Mold Swab - Furnace #2	3.57	5.53	1.97
Mold Swab - Furnace #3	3.91	5.35	1.45
Hot End Coating - Furnace #1	0.84	1.59	0.76
Hot End Coating - Furnace #2	0.76	1.19	0.42
Hot End Coating - Furnace #3	0.83	1.14	0.31
Mixers - Furnace #1	1.24	1.28	0.05
Mixers - Furnace #2	1.23	1.25	0.02
Mixers - Furnace #3	1.23	1.25	0.02
Emergency Generator	0	0.08	0.08
Scrubber Silo	0	0.002	0.002
ESP Dust Silo	0	0.005	0.005
Project-Related Increases:			10.69
Project-Related Decreases:			-8.17
Significance Threshold:			25
Netting Analysis Required?			NO

¹ Baseline Actual Emissions of pollutants that are regulated under Prevention of Significant Deterioration (PSD) (CO, PM, PM₁₀, H₂SO₄ mist, and GHG) and Past Actual Emissions of pollutants that are regulated under Non-attainment New Source Review (NNSR) (NO_x, PM_{2.5}, SO₂, and VOM) are calculated using the facility's average annual glass production rates (tons pulled) during the 24-month period from January 2010 through December 2011.

² The Furnace emission factors used to calculate Baseline Actual or Past Actual Emissions are the following:

PM / PM₁₀ / PM_{2.5}: Emission factors for filterable PM (FPM) are based on the stack tests performed at each Furnace before or during the baseline period (tests conducted 9/29 - 10/1/09 and 7/28 - 7/29/11). To derive a single FPM factor for each Furnace, the factors from the stack tests are weighted based on the relative glass throughput during the period of time over the project baseline when each factor was in effect. Total PM (TPM) factor assumes that condensable PM (CPM) is 18.7% of TPM, based on 2010-2011 compliance test results for the group of similar regenerative Furnaces across SGC's fleet (producing Flint or Georgia Green glass and using 20% - 40% cullet). PM₁₀ and PM_{2.5} factors also assume that 95% of FPM is FPM₁₀ and 91% of FPM is FPM_{2.5}, consistent with AP-42 Table 11.15-3.

SO₂: Emission factors are based on the stack tests performed at each Furnace before or during the baseline period (tests conducted 9/29 - 10/1/09 and 7/28 - 7/29/11). To derive a single factor for each Furnace, the factors from the stack tests are weighted based on the relative glass throughput during the period of time over the project baseline when each factor was in effect.

NO_x: Furnace 1 emission factor is based on compliance testing performed on 6/4/08, since subsequent NO_x testing has not been performed on the Furnace. The Furnace 2 and 3 NO_x emission factors are based on the stack tests performed at each Furnace before or during the baseline period (tests conducted 9/29 - 10/1/09 and 7/28 - 7/29/11). To derive a single factor for each Furnace, the factors from the stack tests are weighted based on the relative glass throughput during the period of time over the project baseline when each factor was in effect.

H₂SO₄ mist: Emission factor is derived from the average of stack testing results for the group of similar regenerative Furnaces across SGC's fleet (producing Flint or Georgia Green glass) over the 2010 - 2011 timeframe.

VOM, CO: Emission factors per AP-42, Section 11.15, Table 11.15-2, 10/86.

³ Post-project emissions of pollutants that are regulated under PSD (CO, PM, PM₁₀, H₂SO₄ mist, and GHG) are future projected actual emissions after the project. Post-project emissions of pollutants that are regulated under NNSR (NO_x, PM_{2.5}, SO₂, and VOM) are future permitted emissions.

⁴ Post-Project Emissions are calculated based on the post-project maximum annual pull rates for Furnaces #1, #2, and #3. All other production rates are increased in proportion to the increased glass pull rate across the Furnaces. Post-project Furnace emission factors reflect GCD controls:

PM / PM₁₀ / PM_{2.5}: Post-project emission factors for filterable PM (FPM) from each Furnace are based on the GCD limit [IV.9.c]. Total PM (TPM) factor assumes that CPM is 31% of TPM for Furnace #1, 39.4% of TPM for Furnace #2, and 33.3% of TPM for Furnace #3, conservatively assuming that CPM emissions remain unchanged from the results of the most recent stack tests. PM₁₀ and PM_{2.5} factors also assume that 75% of FPM is FPM₁₀ and 53% of FPM is FPM_{2.5}, consistent with AP-42 Table 11.15-3 for an ESP-controlled Furnace.

SO₂: Post-project emission factors are based on the GCD limit of 50 ppm (for a pre-control SO₂ concentration less than 167 ppmv) and on the expected performance of the dry scrubber to be installed as part of the proposed project, given the expected inlet SO₂ concentrations at each Furnace taken from the most recent stack test results.

NO_x: As specified by GCD, IV.7.d.ii.

H₂SO₄ mist: Post-project emission factor is based on recent stack testing results of other SGC1 Furnaces with SO₂ controls while accounting for expected variability of Furnace operation.

VOM, CO: Emission factors per AP-42, Section 11.15, Table 11.15-2, 10/86.

⁵ Project-Related Emissions Increase/Decrease = Future Projected Actual Emissions - Baseline Actual Emissions (for pollutants regulated under PSD)

Project-Related Emissions Increase/Decrease = Future Permitted Emissions - Past Actual Emissions (for pollutants regulated under NNSR).

<div> <div>ENVIRON</div> <div> Saint-Gobain Containers, Inc. Dolton Furnace #1 & #2 & #3 Modifications Project-Related PM₁₀ Emission Changes </div> </div>			
Signature: MMW		Date Calc Made Final: 9/13/2012	
Checked by: JGB/BED		Page: 3	
Source	Baseline or Past Actual Emissions (tpy) ^{1,2}	Post-Project Emissions (tpy) ^{2,4}	Project-Related Emissions Increase/Decrease (tpy)
Furnace No. 1	17.97	16.78	-1.20
Furnace No. 2	17.78	14.31	-3.47
Furnace No. 3	20.42	12.32	-8.10
Distributors/Forehearths - #1	0.28	0.54	0.26
Distributors/Forehearths - #2	0.24	0.38	0.13
Distributors/Forehearths - #3	0.27	0.36	0.10
Material Handling	0.01	0.02	0.01
Lehrs - Furnace #1	0.03	0.06	0.03
Lehrs - Furnace #2	0.03	0.05	0.02
Lehrs - Furnace #3	0.04	0.05	0.01
Mold Swab - Furnace #1	3.90	7.43	3.53
Mold Swab - Furnace #2	3.57	5.53	1.97
Mold Swab - Furnace #3	3.91	5.35	1.45
Hot End Coating - Furnace #1	0.84	1.59	0.75
Hot End Coating - Furnace #2	0.76	1.19	0.42
Hot End Coating - Furnace #3	0.83	1.14	0.31
Mixers - Furnace #1	1.21	1.23	0.02
Mixers - Furnace #2	1.21	1.22	0.01
Mixers - Furnace #3	1.21	1.22	0.01
Emergency Generator	0	0.08	0.08
Scrubber Silo	0	0.002	0.002
ESP Dust Silo	0	0.005	0.005
Project-Related Increases:			9.11
Project-Related Decreases:			-12.77
Significance Threshold:			15
Netting Analysis Required?			NO

¹ Baseline Actual Emissions of pollutants that are regulated under Prevention of Significant Deterioration (PSD) (CO, PM, PM₁₀, H₂SO₄ mist, and GHG) and Past Actual Emissions of pollutants that are regulated under Non-attainment New Source Review (NNSR) (NOx, PM_{2.5}, SO₂, and VOM) are calculated using the facility's average annual glass production rates (tons pulled) during the 24-month period from January 2010 through December 2011.

² The Furnace emission factors used to calculate Baseline Actual or Past Actual Emissions are the following:

PM / PM₁₀ / PM_{2.5}: Emission factors for filterable PM (FPM) are based on the stack tests performed at each Furnace before or during the baseline period (tests conducted 9/29 - 10/1/09 and 7/28 - 7/29/11). To derive a single FPM factor for each Furnace, the factors from the stack tests are weighted based on the relative glass throughput during the period of time over the project baseline when each factor was in effect. Total PM (TPM) factor assumes that condensable PM (CPM) is 18.7% of TPM, based on 2010-2011 compliance test results for the group of similar regenerative Furnaces across SGC's fleet (producing Flint or Georgia Green glass and using 20% - 40% cullet). PM₁₀ and PM_{2.5} factors also assume that 95% of FPM is FPM₁₀ and 91% of FPM is FPM_{2.5}, consistent with AP-42 Table 11.15-3.

SO₂: Emission factors are based on the stack tests performed at each Furnace before or during the baseline period (tests conducted 9/29 - 10/1/09 and 7/28 - 7/29/11). To derive a single factor for each Furnace, the factors from the stack tests are weighted based on the relative glass throughput during the period of time over the project baseline when each factor was in effect.

NOx: Furnace 1 emission factor is based on compliance testing performed on 6/4/08, since subsequent NOx testing has not been performed on the Furnace. The Furnace 2 and 3 NOx emission factors are based on the stack tests performed at each Furnace before or during the baseline period (tests conducted 9/29 - 10/1/09 and 7/28 - 7/29/11). To derive a single factor for each Furnace, the factors from the stack tests are weighted based on the relative glass throughput during the period of time over the project baseline when each factor was in effect.

H₂SO₄ mist: Emission factor is derived from the average of stack testing results for the group of similar regenerative Furnaces across SGC's fleet (producing Flint or Georgia Green glass) over the 2010 - 2011 timeframe.

VOM, CO: Emission factors per AP-42, Section 11.15, Table 11.15-2, 10/86.

³ Post-project emissions of pollutants that are regulated under PSD (CO, PM, PM₁₀, H₂SO₄ mist, and GHG) are future projected actual emissions after the project. Post-project emissions of pollutants that are regulated under NNSR (NOx, PM_{2.5}, SO₂, and VOM) are future permitted emissions.

⁴ Post-Project Emissions are calculated based on the post-project maximum annual pull rates for Furnaces #1, #2, and #3. All other production rates are increased in proportion to the increased glass pull rate across the Furnaces. Post-project Furnace emission factors reflect GCD controls:

PM / PM₁₀ / PM_{2.5}: Post-project emission factors for filterable PM (FPM) from each Furnace are based on the GCD limit [IV.9.c]. Total PM (TPM) factor assumes that CPM is 31% of TPM for Furnace #1, 39.4% of TPM for Furnace #2, and 33.3% of TPM for Furnace #3, conservatively assuming that CPM emissions remain unchanged from the results of the most recent stack tests. PM₁₀ and PM_{2.5} factors also assume that 75% of FPM is FPM₁₀ and 53% of FPM is FPM_{2.5}, consistent with AP-42 Table 11.15-3 for an ESP-controlled Furnace.

SO₂: Post-project emission factors are based on the GCD limit of 50 ppm (for a pre-control SO₂ concentration less than 167 ppmv) and on the expected performance of the dry scrubber to be installed as part of the proposed project, given the expected inlet SO₂ concentrations at each Furnace taken from the most recent stack test results.

NOx: As specified by GCD, IV.7.d.ii.

H₂SO₄ mist: Post-project emission factor is based on recent stack testing results of other SGC Furnaces with SO₂ controls while accounting for expected variability of Furnace operation.

VOM, CO: Emission factors per AP-42, Section 11.15, Table 11.15-2, 10/86.

⁵ Project-Related Emissions Increase/Decrease = Future Projected Actual Emissions - Baseline Actual Emissions (for pollutants regulated under PSD)

Project-Related Emissions Increase/Decrease = Future Permitted Emissions - Past Actual Emissions (for pollutants regulated under NNSR).

ENVIRON		Saint-Gobain Containers, Inc. Dolton Furnace #1 & #2 & #3 Modifications Project-Related PM _{2.5} Emission Changes	
Signature: MMW		Date Calc Made Final: 9/13/2012	
Checked by: JGB/BED		Page: 4	
Source	Baseline or Past Actual Emissions (tpy) ^{1,2}	Post-Project Emissions (tpy) ^{3,4}	Project-Related Emissions Increase/Decrease (tpy) ⁵
Furnace No. 1	17.96	13.70	-3.66
Furnace No. 2	17.18	12.06	-5.12
Furnace No. 3	19.73	10.15	-9.57
Distributors/Forehearth - #1	0.28	0.54	0.26
Distributors/Forehearth - #2	0.24	0.38	0.13
Distributors/Forehearth - #3	0.27	0.36	0.10
Material Handling	0.01	0.02	0.01
Lehrs - Furnace #1	0.03	0.06	0.03
Lehrs - Furnace #2	0.03	0.05	0.02
Lehrs - Furnace #3	0.04	0.05	0.01
Mold Swab - Furnace #1	3.90	7.43	3.53
Mold Swab - Furnace #2	3.57	5.53	1.97
Mold Swab - Furnace #3	3.91	5.35	1.45
Hot End Coating - Furnace #1	0.84	1.59	0.76
Hot End Coating - Furnace #2	0.76	1.19	0.42
Hot End Coating - Furnace #3	0.83	1.14	0.31
Mixers - Furnace #1	1.188	1.192	0.003
Mixers - Furnace #2	1.188	1.190	0.002
Mixers - Furnace #3	1.188	1.190	0.001
Emergency Generator	0	0.083	0.083
Scrubber Silo	0	0.002	0.002
ESP Dust Silo	0	0.005	0.005
Project-Related Increases:			9.08
Project-Related Decreases:			-18.36
Significance Threshold:			10
Netting Analysis Required??			NO

¹ Baseline Actual Emissions of pollutants that are regulated under Prevention of Significant Deterioration (PSD) (CO, PM, PM₁₀, H₂SO₄ mist, and GHG) and Past Actual Emissions of pollutants that are regulated under Non-attainment New Source Review (NNSR) (NO_x, PM_{2.5}, SO₂, and VOM) are calculated using the facility's average annual glass production rates (tons pulled) during the 24-month period from January 2010 through December 2011.

² The Furnace emission factors used to calculate Baseline Actual or Past Actual Emissions are the following:

PM / PM₁₀ / PM_{2.5}: Emission factors for filterable PM (FPM) are based on the stack tests performed at each Furnace before or during the baseline period (tests conducted 9/29 - 10/1/09 and 7/28 - 7/29/11). To derive a single FPM factor for each Furnace, the factors from the stack tests are weighted based on the relative glass throughput during the period of time over the project baseline when each factor was in effect. Total PM (TPM) factor assumes that condensable PM (CPM) is 16.7% of TPM, based on 2010-2011 compliance test results for the group of similar regenerative Furnaces across SCGI's fleet (producing Flint or Georgia Green glass and using 20% - 40% cullet). PM₁₀ and PM_{2.5} factors also assume that 95% of FPM is FPM₁₀ and 91% of FPM is FPM_{2.5}, consistent with AP-42 Table 11.15-3.

SO₂: Emission factors are based on the stack tests performed at each Furnace before or during the baseline period (tests conducted 9/29 - 10/1/09 and 7/28 - 7/29/11). To derive a single factor for each Furnace, the factors from the stack tests are weighted based on the relative glass throughput during the period of time over the project baseline when each factor was in effect.

NO_x: Furnace 1 emission factor is based on compliance testing performed on 6/4/08, since subsequent NO_x testing has not been performed on the Furnace. The Furnace 2 and 3 NO_x emission factors are based on the stack tests performed at each Furnace before or during the baseline period (tests conducted 9/29 - 10/1/09 and 7/28 - 7/29/11). To derive a single factor for each Furnace, the factors from the stack tests are weighted based on the relative glass throughput during the period of time over the project baseline when each factor was in effect.

H₂SO₄ mist: Emission factor is derived from the average of stack testing results for the group of similar regenerative Furnaces across SCGI's fleet (producing Flint or Georgia Green glass) over the 2010 - 2011 timeframe.

VOM, CO: Emission factors per AP-42, Section 11.15, Table 11.15-2, 10/86.

³ Post-project emissions of pollutants that are regulated under PSD (CO, PM, PM₁₀, H₂SO₄ mist, and GHG) are future projected actual emissions after the project. Post-project emissions of pollutants that are regulated under NNSR (NO_x, PM_{2.5}, SO₂, and VOM) are future permitted emissions.

⁴ Post-Project Emissions are calculated based on the post-project maximum annual pull rates for Furnaces #1, #2, and #3. All other production rates are increased in proportion to the increased glass pull rate across the Furnaces. Post-project Furnace emission factors reflect GCD controls:

PM / PM₁₀ / PM_{2.5}: Post-project emission factors for filterable PM (FPM) from each Furnace are based on the GCD limit [IV.9.c]. Total PM (TPM) factor assumes that CPM is 31% of TPM for Furnace #1, 39.4% of TPM for Furnace #2, and 33.3% of TPM for Furnace #3, conservatively assuming that CPM emissions remain unchanged from the results of the most recent stack tests. PM₁₀ and PM_{2.5} factors also assume that 75% of FPM is FPM₁₀ and 53% of FPM is FPM_{2.5}, consistent with AP-42 Table 11.15-3 for an ESP-controlled Furnace.

SO₂: Post-project emission factors are based on the GCD limit of 60 ppm (for a pre-control SO₂ concentration less than 167 ppmv) and on the expected performance of the dry scrubber to be installed as part of the proposed project, given the expected inlet SO₂ concentrations at each Furnace taken from the most recent stack test results.

NO_x: As specified by GCD, IV.7.d.ii.

H₂SO₄ mist: Post-project emission factor is based on recent stack testing results of other SGCI Furnaces with SO₂ controls while accounting for expected variability of Furnace operation.

VOM, CO: Emission factors per AP-42, Section 11.15, Table 11.15-2, 10/86.

⁵ Project-Related Emissions Increase/Decrease = Future Projected Actual Emissions - Baseline Actual Emissions (for pollutants regulated under PSD)

Project-Related Emissions Increase/Decrease = Future Permitted Emissions - Past Actual Emissions (for pollutants regulated under NNSR).

ENVIRON		Saint-Gobain Containers, Inc. Dolton Furnace #1 & #2 & #3 Modifications Project-Related SO ₂ Emission Changes	
Signature: MMW Checked by: JGB/BED		Date Calc Made Final: 9/13/2012 Page: 5	
Source	Baseline or Past Actual Emissions (tpy) ^{1,2}	Post-Project Emissions (tpy) ^{3,4}	Project-Related Emissions Increase/Decrease (tpy) ⁵
Furnace No. 1	37.02	38.58	1.56
Furnace No. 2	48.83	41.45	-7.37
Furnace No. 3	71.60	53.71	-17.89
Distributors/Forehearths - #1	0.02	0.04	0.02
Distributors/Forehearths - #2	0.02	0.03	0.01
Distributors/Forehearths - #3	0.02	0.03	0.01
Lehrs - #1	0.002	0.004	0.002
Lehrs - #2	0.002	0.004	0.001
Lehrs - #3	0.003	0.004	0.001
Emergency Generator	0	0.003	0.003
Project-Related Increases:			1.60
Project-Related Decreases:			-25.26
Significance Threshold:			40
Netting Analysis Required?			NO

¹ Baseline Actual Emissions of pollutants that are regulated under Prevention of Significant Deterioration (PSD) (CO, PM, PM₁₀, H₂SO₄ mist, and GHG) and Past Actual Emissions of pollutants that are regulated under Non-attainment New Source Review (NNSR) (NO_x, PM_{2.5}, SO₂, and VOM) are calculated using the facility's average annual glass production rates (tons pulled) during the 24-month period from January 2010 through December 2011.

² The Furnace emission factors used to calculate Baseline Actual or Past Actual Emissions are the following:
PM / PM₁₀ / PM_{2.5}: Emission factors for filterable PM (FPM) are based on the stack tests performed at each Furnace before or during the baseline period (tests conducted 9/29 - 10/1/09 and 7/28 - 7/29/11). To derive a single FPM factor for each Furnace, the factors from the stack tests are weighted based on the relative glass throughput during the period of time over the project baseline when each factor was in effect. Total PM (TPM) factor assumes that condensable PM (CPM) is 18.7% of TPM, based on 2010-2011 compliance test results for the group of similar regenerative Furnaces across SGC's fleet (producing Flint or Georgia Green glass and using 20% - 40% cullet). PM₁₀ and PM_{2.5} factors also assume that 95% of FPM is FPM₁₀ and 91% of FPM is FPM_{2.5}, consistent with AP-42 Table 11.15-3.

SO₂: Emission factors are based on the stack tests performed at each Furnace before or during the baseline period (tests conducted 9/29 - 10/1/09 and 7/28 - 7/29/11). To derive a single factor for each Furnace, the factors from the stack tests are weighted based on the relative glass throughput during the period of time over the project baseline when each factor was in effect.

NO_x: Furnace 1 emission factor is based on compliance testing performed on 6/4/08, since subsequent NO_x testing has not been performed on the Furnace. The Furnace 2 and 3 NO_x emission factors are based on the stack tests performed at each Furnace before or during the baseline period (tests conducted 9/29 - 10/1/09 and 7/28 - 7/29/11). To derive a single factor for each Furnace, the factors from the stack tests are weighted based on the relative glass throughput during the period of time over the project baseline when each factor was in effect.

H₂SO₄ mist: Emission factor is derived from the average of stack testing results for the group of similar regenerative Furnaces across SGC's fleet (producing Flint or Georgia Green glass) over the 2010 - 2011 timeframe.

VOM, CO: Emission factors per AP-42, Section 11.15, Table 11.15-2, 10/86.

³ Post-project emissions of pollutants that are regulated under PSD (CO, PM, PM₁₀, H₂SO₄ mist, and GHG) are future projected actual emissions after the project. Post-project emissions of pollutants that are regulated under NNSR (NO_x, PM_{2.5}, SO₂, and VOM) are future permitted emissions.

⁴ Post-Project Emissions are calculated based on the post-project maximum annual pull rates for Furnaces #1, #2, and #3. All other production rates are increased in proportion to the increased glass pull rate across the Furnaces. Post-project Furnace emission factors reflect GCD controls:

PM / PM₁₀ / PM_{2.5}: Post-project emission factors for filterable PM (FPM) from each Furnace are based on the GCD limit [IV.9.c]. Total PM (TPM) factor assumes that CPM is 31% of TPM for Furnace #1, 39.4% of TPM for Furnace #2, and 33.3% of TPM for Furnace #3, conservatively assuming that CPM emissions remain unchanged from the results of the most recent stack tests. PM₁₀ and PM_{2.5} factors also assume that 75% of FPM is FPM₁₀ and 53% of FPM is FPM_{2.5}, consistent with AP-42 Table 11.15-3 for an ESP-controlled Furnace.

SO₂: Post-project emission factors are based on the GCD limit of 50 ppm (for a pre-control SO₂ concentration less than 167 ppmv) and on the expected performance of the dry scrubber to be installed as part of the proposed project, given the expected inlet SO₂ concentrations at each Furnace taken from the most recent stack test results.


NO_x: As specified by GCD, IV.7.d.ii.

H₂SO₄ mist: Post-project emission factor is based on recent stack testing results of other SGC's Furnaces with SO₂ controls while accounting for expected variability of Furnace operation.

VOM, CO: Emission factors per AP-42, Section 11.15, Table 11.15-2, 10/86.

⁵ Project-Related Emissions Increase/Decrease = Future Projected Actual Emissions - Baseline Actual Emissions (for pollutants regulated under PSD)

Project-Related Emissions Increase/Decrease = Future Permitted Emissions - Past Actual Emissions (for pollutants regulated under NNSR).

		Saint-Gobain Containers, Inc. Dolton Furnace #1 & #2 & #3 Modifications Project-Related NO ₂ Emission Changes	
Signature: MMW		Date Calc Made Final: 9/13/2012	
Checked by: JGB/BD		Page: 6	
Source	Baseline or Past Actual Emissions (tpy) ^{1,2}	Post-Project Emissions (tpy) ^{3,4}	Project-Related Emissions Increase/Decrease (tpy) ⁵
Furnace No. 1	143.19	90.87	-52.32
Furnace No. 2	107.91	65.43	-41.48
Furnace No. 3	171.84	64.09	-107.79
Distributors/Forehearths - #1	3.74	7.11	3.38
Distributors/Forehearths - #2	3.21	4.97	1.77
Distributors/Forehearths - #3	3.50	4.79	1.30
Lehrs - #1	0.39	0.75	0.355
Lehrs - #2	0.41	0.63	0.225
Lehrs - #3	0.50	0.69	0.187
Emergency Generator	0	2.646	2.646
Project-Related Increases:			9.85
Project-Related Decreases:			-201.59
Significance Threshold:			40
Netting Analysis Required?			NO

¹ Baseline Actual Emissions of pollutants that are regulated under Prevention of Significant Deterioration (PSD) (CO, PM, PM₁₀, H₂SO₄ mist, and GHG) and Past Actual Emissions of pollutants that are regulated under Non-attainment New Source Review (NNSR) (NO_x, PM_{2.5}, SO₂, and VOM) are calculated using the facility's average annual glass production rates (tons pulled) during the 24-month period from January 2010 through December 2011.

² The Furnace emission factors used to calculate Baseline Actual or Past Actual Emissions are the following:

PM / PM₁₀ / PM_{2.5}: Emission factors for filterable PM (FPM) are based on the stack tests performed at each Furnace before or during the baseline period (tests conducted 9/29 - 10/1/09 and 7/28 - 7/29/11). To derive a single FPM factor for each Furnace, the factors from the stack tests are weighted based on the relative glass throughput during the period of time over the project baseline when each factor was in effect. Total PM (TPM) factor assumes that condensable PM (CPM) is 18.7% of TPM, based on 2010-2011 compliance test results for the group of similar regenerative Furnaces across SGC's fleet (producing Flint or Georgia Green glass and using 20% - 40% cullet). PM₁₀ and PM_{2.5} factors also assume that 95% of FPM is FPM₁₀ and 91% of FPM is FPM_{2.5}, consistent with AP-42 Table 11.15-3.

SO₂: Emission factors are based on the stack tests performed at each Furnace before or during the baseline period (tests conducted 9/29 - 10/1/09 and 7/28 - 7/29/11). To derive a single factor for each Furnace, the factors from the stack tests are weighted based on the relative glass throughput during the period of time over the project baseline when each factor was in effect.

NO_x: Furnace 1 emission factor is based on compliance testing performed on 6/4/08, since subsequent NO_x testing has not been performed on the Furnace. The Furnace 2 and 3 NO_x emission factors are based on the stack tests performed at each Furnace before or during the baseline period (tests conducted 9/29 - 10/1/09 and 7/28 - 7/29/11). To derive a single factor for each Furnace, the factors from the stack tests are weighted based on the relative glass throughput during the period of time over the project baseline when each factor was in effect.

H₂SO₄ mist: Emission factor is derived from the average of stack testing results for the group of similar regenerative Furnaces across SGC's fleet (producing Flint or Georgia Green glass) over the 2010 - 2011 timeframe.

VOM, CO: Emission factors per AP-42, Section 11.15, Table 11.15-2, 10/86.

³ Post-project emissions of pollutants that are regulated under PSD (CO, PM, PM₁₀, H₂SO₄ mist, and GHG) are future projected actual emissions after the project. Post-project emissions of pollutants that are regulated under NNSR (NO_x, PM_{2.5}, SO₂, and VOM) are future permitted emissions.

⁴ Post-Project Emissions are calculated based on the post-project maximum annual pull rates for Furnaces #1, #2, and #3. All other production rates are increased in proportion to the increased glass pull rate across the Furnaces. Post-project Furnace emission factors reflect GCD controls:

PM / PM₁₀ / PM_{2.5}: Post-project emission factors for filterable PM (FPM) from each Furnace are based on the GCD limit [IV.9.c]. Total PM (TPM) factor assumes that CPM is 31% of TPM for Furnace #1, 39.4% of TPM for Furnace #2, and 33.3% of TPM for Furnace #3, conservatively assuming that CPM emissions remain unchanged from the results of the most recent stack tests. PM₁₀ and PM_{2.5} factors also assume that 75% of FPM is FPM₁₀ and 53% of FPM is FPM_{2.5}, consistent with AP-42 Table 11.15-3 for an ESP-controlled Furnace.

SO₂: Post-project emission factors are based on the GCD limit of 50 ppm (for a pre-control SO₂ concentration less than 167 ppmv) and on the expected performance of the dry scrubber to be installed as part of the proposed project, given the expected inlet SO₂ concentrations at each Furnace taken from the most recent stack test results.

NO_x: As specified by GCD, IV.7.d.ii.

H₂SO₄ mist: Post-project emission factor is based on recent stack testing results of other SGC Furnaces with SO₂ controls while accounting for expected variability of Furnace operation.

VOM, CO: Emission factors per AP-42, Section 11.15, Table 11.15-2, 10/86.

⁵ Project-Related Emissions Increase/Decrease = Future Projected Actual Emissions - Baseline Actual Emissions (for pollutants regulated under PSD)
Project-Related Emissions Increase/Decrease = Future Permitted Emissions - Past Actual Emissions (for pollutants regulated under NNSR).

ENVIRON		Saint-Gobain Containers, Inc. Dolton Furnace #1 & #2 & #3 Modifications Project-Related CO Emission Changes	
Signature: MMW		Date Calc Made Final: 9/13/2012	
Checked by: JGB/BED		Page: 7	
Source	Baseline or Past Actual Emissions (tpy) ^{1,2}	Post-Project Emissions (tpy) ^{3,4}	Project-Related Emissions Increase/Decrease (tpy) ⁵
Furnace No. 1	7.34	13.98	6.64
Furnace No. 2	6.59	10.22	3.63
Furnace No. 3	7.19	9.86	2.66
Distributors/Forehearth - #1	3.14	5.97	2.84
Distributors/Forehearth - #2	2.69	4.18	1.48
Distributors/Forehearth - #3	2.94	4.03	1.09
Lehrs - #1	0.33	0.63	0.30
Lehrs - #2	0.34	0.53	0.19
Lehrs - #3	0.42	0.58	0.16
Emergency Generator	0	1.45	1.45
Project-Related Increases:			20.43
Project-Related Decreases:			0.00
Significance Threshold:			100
Netting Analysis Required?			NO

¹ Baseline Actual Emissions of pollutants that are regulated under Prevention of Significant Deterioration (PSD) (CO, PM, PM₁₀, H₂SO₄ mist, and GHG) and Past Actual Emissions of pollutants that are regulated under Non-attainment New Source Review (NNSR) (NOx, PM_{2.5}, SO₂, and VOM) are calculated using the facility's average annual glass production rates (tons pulled) during the 24-month period from January 2010 through December 2011.

² The Furnace emission factors used to calculate Baseline Actual or Past Actual Emissions are the following:

PM / PM₁₀ / PM_{2.5}: Emission factors for filterable PM (FPM) are based on the stack tests performed at each Furnace before or during the baseline period (tests conducted 9/29 - 10/1/09 and 7/28 - 7/29/11). To derive a single FPM factor for each Furnace, the factors from the stack tests are weighted based on the relative glass throughput during the period of time over the project baseline when each factor was in effect. Total PM (TPM) factor assumes that condensable PM (CPM) is 18.7% of TPM, based on 2010-2011 compliance test results for the group of similar regenerative Furnaces across SGC's fleet (producing Flint or Georgia Green glass and using 20% - 40% cullet). PM₁₀ and PM_{2.5} factors also assume that 95% of FPM is FPM₁₀ and 91% of FPM is FPM_{2.5}, consistent with AP-42 Table 11.15-3.

SO₂: Emission factors are based on the stack tests performed at each Furnace before or during the baseline period (tests conducted 9/29 - 10/1/09 and 7/28 - 7/29/11). To derive a single factor for each Furnace, the factors from the stack tests are weighted based on the relative glass throughput during the period of time over the project baseline when each factor was in effect.

NOx: Furnace 1 emission factor is based on compliance testing performed on 6/4/08, since subsequent NOx testing has not been performed on the Furnace. The Furnace 2 and 3 NOx emission factors are based on the stack tests performed at each Furnace before or during the baseline period (tests conducted 9/29 - 10/1/09 and 7/28 - 7/29/11). To derive a single factor for each Furnace, the factors from the stack tests are weighted based on the relative glass throughput during the period of time over the project baseline when each factor was in effect.

H₂SO₄ mist: Emission factor is derived from the average of stack testing results for the group of similar regenerative Furnaces across SGC's fleet (producing Flint or Georgia Green glass) over the 2010 - 2011 timeframe.

VOM, CO: Emission factors per AP-42, Section 11.15, Table 11.15-2, 10/86.

³ Post-project emissions of pollutants that are regulated under PSD (CO, PM, PM₁₀, H₂SO₄ mist, and GHG) are future projected actual emissions after the project. Post-project emissions of pollutants that are regulated under NNSR (NOx, PM_{2.5}, SO₂, and VOM) are future permitted emissions.

⁴ Post-Project Emissions are calculated based on the post-project maximum annual pull rates for Furnaces #1, #2, and #3. All other production rates are increased in proportion to the increased glass pull rate across the Furnaces. Post-project Furnace emission factors reflect GCD controls:

PM / PM₁₀ / PM_{2.5}: Post-project emission factors for filterable PM (FPM) from each Furnace are based on the GCD limit (IV.9.c). Total PM (TPM) factor assumes that CPM is 31% of TPM for Furnace #1, 39.4% of TPM for Furnace #2, and 33.3% of TPM for Furnace #3, conservatively assuming that CPM emissions remain unchanged from the results of the most recent stack tests. PM₁₀ and PM_{2.5} factors also assume that 75% of FPM is FPM₁₀ and 53% of FPM is FPM_{2.5}, consistent with AP-42 Table 11.15-3 for an ESP-controlled Furnace.

SO₂: Post-project emission factors are based on the GCD limit of 50 ppm (for a pre-control SO₂ concentration less than 167 ppmv) and on the expected performance of the dry scrubber to be installed as part of the proposed project, given the expected inlet SO₂ concentrations at each Furnace taken from the most recent stack test results.

NOx: As specified by GCD, IV.7 d.ii.

H₂SO₄ mist: Post-project emission factor is based on recent stack testing results of other SGC Furnaces with SO₂ controls while accounting for expected variability of Furnace operation.

VOM, CO: Emission factors per AP-42, Section 11.15, Table 11.15-2, 10/86.

⁵ Project-Related Emissions Increase/Decrease = Future Projected Actual Emissions - Baseline Actual Emissions (for pollutants regulated under PSD)

Project-Related Emissions Increase/Decrease = Future Permitted Emissions - Past Actual Emissions (for pollutants regulated under NNSR).

ENVIRON		Saint-Gobain Containers, Inc. Dolton Furnace #1 & #2 & #3 Modifications Project-Related H ₂ SO ₄ Mist Emission Changes	
Signature: MMW		Date Calc Made Final: 9/13/2012	
Checked by: JGB/ED		Page: 8	
Source	Baseline or Past Actual Emissions (tpy) ^{1,2}	Post-Project Emissions (tpy) ^{3,4}	Project-Related Emissions Increase/Decrease (tpy) ⁵
Furnace No. 1	8.74	6.99	-1.75
Furnace No. 2	7.84	5.11	-2.73
Furnace No. 3	8.56	4.93	-3.63
Project-Related Increases:			0.00
Project-Related Decreases:			-8.12
Significance Threshold:			7
Netting Analysis Required?			NO

¹ Baseline Actual Emissions of pollutants that are regulated under Prevention of Significant Deterioration (PSD) (CO, PM, PM₁₀, H₂SO₄ mist, and GHG) and Past Actual Emissions of pollutants that are regulated under Non-attainment New Source Review (NNSR) (NOx, PM_{2.5}, SO₂, and VOM) are calculated using the facility's average annual glass production rates (tons pulled) during the 24-month period from January 2010 through December 2011.

² The Furnace emission factors used to calculate Baseline Actual or Past Actual Emissions are the following:

PM / PM₁₀ / PM_{2.5}: Emission factors for filterable PM (FPM) are based on the stack tests performed at each Furnace before or during the baseline period (tests conducted 9/29 - 10/1/09 and 7/28 - 7/29/11). To derive a single FPM factor for each Furnace, the factors from the stack tests are weighted based on the relative glass throughput during the period of time over the project baseline when each factor was in effect. Total PM (TPM) factor assumes that condensable PM (CPM) is 18.7% of TPM, based on 2010-2011 compliance test results for the group of similar regenerative Furnaces across SGC's fleet (producing Flint or Georgia Green glass and using 20% - 40% cullet). PM₁₀ and PM_{2.5} factors also assume that 95% of FPM is FPM₁₀ and 91% of FPM is FPM_{2.5}, consistent with AP-42 Table 11.15-3.

SO₂: Emission factors are based on the stack tests performed at each Furnace before or during the baseline period (tests conducted 9/29 - 10/1/09 and 7/28 - 7/29/11). To derive a single factor for each Furnace, the factors from the stack tests are weighted based on the relative glass throughput during the period of time over the project baseline when each factor was in effect.

NOx: Furnace 1 emission factor is based on compliance testing performed on 6/4/08, since subsequent NOx testing has not been performed on the Furnace. The Furnace 2 and 3 NOx emission factors are based on the stack tests performed at each Furnace before or during the baseline period (tests conducted 9/29 - 10/1/09 and 7/28 - 7/29/11). To derive a single factor for each Furnace, the factors from the stack tests are weighted based on the relative glass throughput during the period of time over the project baseline when each factor was in effect.

H₂SO₄ mist: Emission factor is derived from the average of stack testing results for the group of similar regenerative Furnaces across SGC's fleet (producing Flint or Georgia Green glass) over the 2010 - 2011 timeframe.

VOM, CO: Emission factors per AP-42, Section 11.15, Table 11.15-2, 10/86.

³ Post-project emissions of pollutants that are regulated under PSD (CO, PM, PM₁₀, H₂SO₄ mist, and GHG) are future projected actual emissions after the project. Post-project emissions of pollutants that are regulated under NNSR (NOx, PM_{2.5}, SO₂, and VOM) are future permitted emissions.

⁴ Post-Project Emissions are calculated based on the post-project maximum annual pull rates for Furnaces #1, #2, and #3. All other production rates are increased in proportion to the increased glass pull rate across the Furnaces. Post-project Furnace emission factors reflect GCD controls:

PM / PM₁₀ / PM_{2.5}: Post-project emission factors for filterable PM (FPM) from each Furnace are based on the GCD limit [IV.9.c]. Total PM (TPM) factor assumes that CPM is 31% of TPM for Furnace #1, 39.4% of TPM for Furnace #2, and 33.3% of TPM for Furnace #3, conservatively assuming that CPM emissions remain unchanged from the results of the most recent stack tests. PM₁₀ and PM_{2.5} factors also assume that 75% of FPM is FPM₁₀ and 53% of FPM is FPM_{2.5}, consistent with AP-42 Table 11.15-3 for an ESP-controlled Furnace.

SO₂: Post-project emission factors are based on the GCD limit of 50 ppm (for a pre-control) SO₂ concentration less than 167 ppmv) and on the expected performance of the dry scrubber to be installed as part of the proposed project, given the expected inlet SO₂ concentrations at each Furnace taken from the most recent stack test results.

NOx: As specified by GCD, IV.7.d.ii.

H₂SO₄ mist: Post-project emission factor is based on recent stack testing results of other SGC Furnaces with SO₂ controls while accounting for expected variability of Furnace operation.

VOM, CO: Emission factors per AP-42, Section 11.15, Table 11.15-2, 10/86.

⁵ Project-Related Emissions Increase/Decrease = Future Projected Actual Emissions - Baseline Actual Emissions (for pollutants regulated under PSD)

Project-Related Emissions Increase/Decrease = Future Permitted Emissions - Past Actual Emissions (for pollutants regulated under NNSR).

ENVIRON		Saint-Gobain Containers, Inc. Dolton Furnace #1 & #2 & #3 Modifications Project-Related CO ₂ e Emission Changes	
Signature: <i>MMW</i>		Date Calc Made Final: 9/13/2012	
Checked by: <i>JGB/BED</i>		Page: 9	
Source	Baseline Actual Emissions (tpy) ¹	Post-Project Emissions (tpy) ^{2,3}	Project-Related Emissions Increase/Decrease (tpy) ⁴
Furnace No. 1 & No. 2 & No. 3	56,347	94,561	38,213
Distributor/Forehearths/Lehrs	14,125	22,790	8,665
Emergency Generator	0	105	105
Scrubber Sorbent Reaction	0	253	253
CO ₂ e Project-Related Increases:			47,236
CO ₂ e Project-Related Decreases:			0
CO ₂ e Significance Threshold:			75,000
GHG Project Related Increases:			47,199
GHG Significance Threshold:			0
Netting Analysis Required?			NO

* Netting only required if both GHG and CO₂e are greater than the applicable thresholds.

¹ Baseline Actual CO₂(e) Emissions from natural gas combustion are calculated using the facility's average natural gas consumption rates (MMscf) during the 24-month baseline period from January 2010 through December 2011. The Tier 1 calculation methodology specified in 40 CFR 98 Subpart C is used. Baseline Actual CO₂(e) Emissions from glass production are calculated using the facility's average material feed rates (ton/yr charged) during the 24-month baseline period from January 2010 through December 2011. The calculation methodology specified in 40 CFR 98 Subpart N is used.

² Post-project emissions of pollutants that are regulated under Prevention of Significant Deterioration (PSD) (CO, PM, PM₁₀, H₂SO₄ mist, and GHG) are future projected actual emissions after the project. Post-project emissions of pollutants that are regulated under Non-attainment New Source Review (NNSR) (NOx, PM_{2.5}, SO₂, and VOM) are future permitted emissions.

³ Post-Project Emissions are calculated based on natural gas and diesel fuel consumption rates and material feed rates increased in proportion to the increased glass pull rate for Furnaces #1, #2, and #3. Emissions of CO₂(e) from natural gas combustion, diesel combustion, and sorbent injection are calculated according to the methodologies specified in 40 CFR 98 Subpart C; emissions of CO₂(e) from glass production are calculated according to the methodologies specified in 40 CFR 98 Subpart N.

⁴ Project-Related Emissions Increase/Decrease = Projected Actual Emissions - Baseline Actual Emissions (for pollutants regulated under PSD)
Project-Related Emissions Increase/Decrease = Future Permitted Emissions - Baseline Actual Emissions (for pollutants regulated under NNSR).

ENVIRON		Saint-Gobain Containers, Inc. Dolton Furnace #1 & #2 & #3 Modifications Project-Related GHG Emission Changes	
Signature: MMW Checked by: JGB/RED		Date Calc Made Final: 9/13/2012 Page: 10	
Source	Baseline Actual Emissions (tpy) ¹	Post-Project Emissions (tpy) ^{2,3}	Project-Related Emissions Increase/Decrease (tpy) ⁴
Furnace No. 1 & No. 2 & No. 3	56,302	94,488	38,185
Distributor/Forehearths/Lehrs	14,112	22,768	8,657
Emergency Generator	0	104	104
Scrubber Sorbent Reaction	0	253	253
GHG Project-Related Increases:			47,199
GHG Project-Related Decreases:			0
GHG Significance Threshold:			0
CO ₂ e Project-Related Increases:			47,236
CO ₂ e Significance Threshold:			75,000
Netting Analysis Required?			NO

* Netting only required if both GHG and CO₂e are greater than the applicable thresholds.

¹ Baseline Actual GHG Emissions from natural gas combustion are calculated using the facility's average natural gas consumption rates (MMscf) during the 24-month baseline period from January 2010 through December 2011. The Tier 1 calculation methodology specified in 40 CFR 98 Subpart C is used. Baseline Actual GHG Emissions from glass production are calculated using the facility's average material feed rates (ton/yr charged) during the 24-month baseline period from January 2010 through December 2011. The calculation methodology specified in 40 CFR 98 Subpart N is used.

² Post-project emissions of pollutants that are regulated under Prevention of Significant Deterioration (PSD) (CO, PM, PM₁₀, H₂SO₄ mist, and GHG) are future projected actual emissions after the project. Post-project emissions of pollutants that are regulated under Non-attainment New Source Review (NNSR) (NO_x, PM_{2.5}, SO₂, and VOM) are future permitted emissions.

³ Post-Project Emissions are calculated based on natural gas and diesel fuel consumption rates and material feed rates increased in proportion to the increased glass pull rate for Furnaces #1, #2, and #3. Emissions of CO₂(e) from natural gas combustion, diesel combustion, and sorbent injection are calculated according to the methodologies specified in 40 CFR 98 Subpart C; emissions of CO₂(e) from glass production are calculated according to the methodologies specified in 40 CFR 98 Subpart N.

⁴ Project-Related Emissions Increase/Decrease = Projected Actual Emissions - Baseline Actual Emissions (for pollutants regulated under PSD)
Project-Related Emissions Increase/Decrease = Future Permitted Emissions - Baseline Actual Emissions (for pollutants regulated under NNSR).

ENVIRON		Saint-Gobain Containers, Inc. Dolton Furnace #1 & #2 & #3 Modifications Project-Related NO _x Emission Changes	
Signature: MMW Checked by: JGB/BED		Date Calc Made Final: 9/13/2012 Page: 11	
Source	Baseline or Past Actual Emissions (tpy) ^{1,2}	Post-Project Emissions (tpy) ^{3,4}	Project-Related Emissions Increase/Decrease (tpy) ⁵
Furnace No. 1	143.19	90.87	-52.32
Furnace No. 2	107.91	66.43	-41.48
Furnace No. 3	171.84	64.06	-107.79
Distributors/Forehearths - #1	3.74	7.11	3.38
Distributors/Forehearths - #2	3.21	4.97	1.77
Distributors/Forehearths - #3	3.50	4.79	1.30
Lehrs - #1	0.39	0.75	0.36
Lehrs - #2	0.41	0.63	0.22
Lehrs - #3	0.50	0.69	0.19
Emergency Generator	0	2.65	2.65
Project-Related Increases:			9.85
Project-Related Decreases:			-201.59
Significance Threshold:			40
Netting Analysis Required?			NO

¹ Baseline Actual Emissions of pollutants that are regulated under Prevention of Significant Deterioration (PSD) (CO, PM, PM₁₀, H₂SO₄ mist, and GHG) and Past Actual Emissions of pollutants that are regulated under Non-attainment New Source Review (NNSR) (NO_x, PM_{2.5}, SO₂, and VOM) are calculated using the facility's average annual glass production rates (tons pulled) during the 24-month period from January 2010 through December 2011.

² The Furnace emission factors used to calculate Baseline Actual or Past Actual Emissions are the following:

PM / PM₁₀ / PM_{2.5}: Emission factors for filterable PM (FPM) are based on the stack tests performed at each Furnace before or during the baseline period (tests conducted 9/29 - 10/1/09 and 7/28 - 7/29/11). To derive a single FPM factor for each Furnace, the factors from the stack tests are weighted based on the relative glass throughput during the period of time over the project baseline when each factor was in effect. Total PM (TPM) factor assumes that condensable PM (CPM) is 18.7% of TPM, based on 2010-2011 compliance test results for the group of similar regenerative Furnaces across SGC's fleet (producing Flint or Georgia Green glass and using 20% - 40% cullet). PM₁₀ and PM_{2.5} factors also assume that 95% of FPM is FPM₁₀ and 91% of FPM is FPM_{2.5}, consistent with AP-42 Table 11.15-3.

SO₂: Emission factors are based on the stack tests performed at each Furnace before or during the baseline period (tests conducted 9/29 - 10/1/09 and 7/28 - 7/29/11). To derive a single factor for each Furnace, the factors from the stack tests are weighted based on the relative glass throughput during the period of time over the project baseline when each factor was in effect.

NO_x: Furnace 1 emission factor is based on compliance testing performed on 6/4/08, since subsequent NO_x testing has not been performed on the Furnace. The Furnace 2 and 3 NO_x emission factors are based on the stack tests performed at each Furnace before or during the baseline period (tests conducted 9/29 - 10/1/09 and 7/28 - 7/29/11). To derive a single factor for each Furnace, the factors from the stack tests are weighted based on the relative glass throughput during the period of time over the project baseline when each factor was in effect.

H₂SO₄ mist: Emission factor is derived from the average of stack testing results for the group of similar regenerative Furnaces across SGC's fleet (producing Flint or Georgia Green glass) over the 2010 - 2011 timeframe.

VOM, CO: Emission factors per AP-42, Section 11.15, Table 11.15-2, 10/86.

³ Post-project emissions of pollutants that are regulated under PSD (CO, PM, PM₁₀, H₂SO₄ mist, and GHG) are future projected actual emissions after the project. Post-project emissions of pollutants that are regulated under NNSR (NO_x, PM_{2.5}, SO₂, and VOM) are future permitted emissions.

⁴ Post-Project Emissions are calculated based on the post-project maximum annual pull rates for Furnaces #1, #2, and #3. All other production rates are increased in proportion to the increased glass pull rate across the Furnaces. Post-project Furnace emission factors reflect GCD controls:

PM / PM₁₀ / PM_{2.5}: Post-project emission factors for filterable PM (FPM) from each Furnace are based on the GCD limit (IV.9.c). Total PM (TPM) factor assumes that CPM is 31% of TPM for Furnace #1, 39.4% of TPM for Furnace #2, and 33.3% of TPM for Furnace #3, conservatively assuming that CPM emissions remain unchanged from the results of the most recent stack tests. PM₁₀ and PM_{2.5} factors also assume that 75% of FPM is FPM₁₀ and 53% of FPM is FPM_{2.5}, consistent with AP-42 Table 11.15-3 for an ESP-controlled Furnace.

SO₂: Post-project emission factors are based on the GCD limit of 50 ppm (for a pre-control SO₂ concentration less than 167 ppmv) and on the expected performance of the dry scrubber to be installed as part of the proposed project, given the expected inlet SO₂ concentrations at each Furnace taken from the most recent stack test results.

NO_x: As specified by GCD, IV.7.d.ii.

H₂SO₄ mist: Post-project emission factor is based on recent stack testing results of other SGC Furnaces with SO₂ controls while accounting for expected variability of Furnace operation.

VOM, CO: Emission factors per AP-42, Section 11.15, Table 11.15-2, 10/86.

⁵ Project-Related Emissions Increase/Decrease = Future Projected Actual Emissions - Baseline Actual Emissions (for pollutants regulated under PSD)

Project-Related Emissions Increase/Decrease = Future Permitted Emissions - Past Actual Emissions (for pollutants regulated under NNSR).

ENVIRON		Saint-Gobain Containers, Inc. Dolton Furnace #1 & #2 & #3 Modifications Project-Related VOM Emission Changes	
Signature: MMW Checked by: JGB/BED		Date Calc Made Final: 9/13/2012 Page: 12	
Source	Baseline or Past Actual Emissions (tpy) ^{1,2}	Post-Project Emissions (tpy) ^{3,4}	Project-Related Emissions Increase/Decrease (tpy) ⁵
Furnace No. 1	7.34	13.98	6.64
Furnace No. 2	6.59	10.22	3.63
Furnace No. 3	7.19	9.66	2.56
Distributors/Forehearth - #1	0.21	0.39	0.19
Distributors/Forehearth - #2	0.18	0.27	0.10
Distributors/Forehearth - #3	0.19	0.26	0.07
Lehrs - #1	0.02	0.04	0.020
Lehrs - #2	0.02	0.03	0.012
Lehrs - #3	0.03	0.04	0.010
Emergency Generator	0	0.54	0.54
Project-Related Increases:			13.86
Project-Related Decreases:			0.00
Significance Threshold:			40
Netting Analysis Required?			NO

¹ Baseline Actual Emissions of pollutants that are regulated under Prevention of Significant Deterioration (PSD) (CO, PM, PM₁₀, H₂SO₄ mist, and GHG) and Past Actual Emissions of pollutants that are regulated under Non-attainment New Source Review (NNSR) (NO_x, PM_{2.5}, SO₂, and VOM) are calculated using the facility's average annual glass production rates (tons pulled) during the 24-month period from January 2010 through December 2011.

² The Furnace emission factors used to calculate Baseline Actual or Past Actual Emissions are the following:

PM / PM₁₀ / PM_{2.5}: Emission factors for filterable PM (FPM) are based on the stack tests performed at each Furnace before or during the baseline period (tests conducted 9/29 - 10/1/09 and 7/28 - 7/29/11). To derive a single FPM factor for each Furnace, the factors from the stack tests are weighted based on the relative glass throughput during the period of time over the project baseline when each factor was in effect. Total PM (TPM) factor assumes that condensable PM (CPM) is 18.7% of TPM, based on 2010-2011 compliance test results for the group of similar regenerative Furnaces across SGC's fleet (producing Flint or Georgia Green glass and using 20% - 40% cullet). PM₁₀ and PM_{2.5} factors also assume that 95% of FPM is FPM₁₀ and 91% of FPM is FPM_{2.5}, consistent with AP-42 Table 11.15-3.

SO₂: Emission factors are based on the stack tests performed at each Furnace before or during the baseline period (tests conducted 9/29 - 10/1/09 and 7/28 - 7/29/11). To derive a single factor for each Furnace, the factors from the stack tests are weighted based on the relative glass throughput during the period of time over the project baseline when each factor was in effect.

NO_x: Furnace 1 emission factor is based on compliance testing performed on 6/4/08, since subsequent NO_x testing has not been performed on the Furnace. The Furnace 2 and 3 NO_x emission factors are based on the stack tests performed at each Furnace before or during the baseline period (tests conducted 9/29 - 10/1/09 and 7/28 - 7/29/11). To derive a single factor for each Furnace, the factors from the stack tests are weighted based on the relative glass throughput during the period of time over the project baseline when each factor was in effect.

H₂SO₄ mist: Emission factor is derived from the average of stack testing results for the group of similar regenerative Furnaces across SGC's fleet (producing Flint or Georgia Green glass) over the 2010 - 2011 timeframe.

VOM, CO: Emission factors per AP-42, Section 11.15, Table 11.15-2, 10/86.

³ Post-project emissions of pollutants that are regulated under PSD (CO, PM, PM₁₀, H₂SO₄ mist, and GHG) are future projected actual emissions after the project. Post-project emissions of pollutants that are regulated under NNSR (NO_x, PM_{2.5}, SO₂, and VOM) are future permitted emissions.

⁴ Post-Project Emissions are calculated based on the post-project maximum annual pull rates for Furnaces #1, #2, and #3. All other production rates are increased in proportion to the increased glass pull rate across the Furnaces. Post-project Furnace emission factors reflect GCD controls:

PM / PM₁₀ / PM_{2.5}: Post-project emission factors for filterable PM (FPM) from each Furnace are based on the GCD limit [IV.9.c]. Total PM (TPM) factor assumes that CPM is 31% of TPM for Furnace #1, 39.4% of TPM for Furnace #2, and 33.3% of TPM for Furnace #3, conservatively assuming that CPM emissions remain unchanged from the results of the most recent stack tests. PM₁₀ and PM_{2.5} factors also assume that 75% of FPM is FPM₁₀ and 53% of FPM is FPM_{2.5}, consistent with AP-42 Table 11.15-3 for an ESP-controlled Furnace.

SO₂: Post-project emission factors are based on the GCD limit of 50 ppm (for a pre-control SO₂ concentration less than 167 ppmv) and on the expected performance of the dry scrubber to be installed as part of the proposed project, given the expected inlet SO₂ concentrations at each Furnace taken from the most recent stack test results.

NO_x: As specified by GCD, IV.7.d.ii.

H₂SO₄ mist: Post-project emission factor is based on recent stack testing results of other SGC Furnaces with SO₂ controls while accounting for expected variability of Furnace operation.

VOM, CO: Emission factors per AP-42, Section 11.15, Table 11.15-2, 10/86.

⁵ Project-Related Emissions Increase/Decrease = Future Projected Actual Emissions - Baseline Actual Emissions (for pollutants regulated under PSD)

Project-Related Emissions Increase/Decrease = Future Permitted Emissions - Past Actual Emissions (for pollutants regulated under NNSR).

ENVIRON																				
Signature: MMW Checked by: JGB/BD												Date Calc Made Final: 8/13/2012 Page: 13								
Baseline Actual / Past Actual Emissions																				
Process	Material	Baseline / Past Actual Throughput ^(a)		Emission Factors ^(b)									Baseline Actual / Past Actual Emissions (TPY)							
		Quantity	Unit	PM	PM ₁₀	PM _{2.5}	SO ₂	NOx	H ₂ SO ₄ Mist	VOM	CO	EF Units	PM	PM ₁₀	PM _{2.5}	SO ₂	NOx	H ₂ SO ₄ Mist	VOM	CO
Furnace #1	Glass	73,431	ton/yr	0.51	0.48	0.47	1.01	3.90	0.24	0.2	0.2	lb/ton	18.74	17.97	17.36	37.02	143.19	8.74	7.34	7.34
Furnace #2	Glass	65,895	ton/yr	0.56	0.54	0.52	1.48	3.28	0.24	0.2	0.2	lb/ton	18.54	17.78	17.18	48.83	107.91	7.84	6.59	6.59
Furnace #3	Glass	71,912	ton/yr	0.59	0.57	0.55	1.99	4.78	0.24	0.2	0.2	lb/ton	21.28	20.42	19.73	71.60	171.84	8.56	7.19	7.19
Furnace #1 - Forehearth / Distributors	Natural Gas	74.7	mmcf/yr	7.6	7.6	7.6	0.6	100	--	5.5	84	lb/mmcsf	0.28	0.28	0.28	0.02	3.74	--	0.21	3.14
Furnace #2 - Forehearth / Distributors	Natural Gas	64.2	mmcf/yr	7.6	7.6	7.6	0.6	100	--	5.5	84	lb/mmcsf	0.24	0.24	0.24	0.02	3.21	--	0.18	2.69
Furnace #3 - Forehearth / Distributors	Natural Gas	70.0	mmcf/yr	7.6	7.6	7.6	0.6	100	--	5.5	84	lb/mmcsf	0.27	0.27	0.27	0.02	3.50	--	0.19	2.84
Material Handling	Material	2,891	lbs of Uncon PM	0.01	0.01	0.01	--	--	--	--	--	lb/lb mat	0.01	0.01	0.01	--	--	--	--	--
Furnace #1 - Lehrs	Natural Gas	7.87	mmcf/yr	7.6	7.6	7.6	0.6	100	--	5.5	84	lb/mmcsf	0.03	0.03	0.03	0.002	0.393	--	0.02	0.33
Furnace #2 - Lehrs	Natural Gas	8.16	mmcf/yr	7.6	7.6	7.6	0.6	100	--	5.5	84	lb/mmcsf	0.03	0.03	0.03	0.002	0.408	--	0.02	0.34
Furnace #3 - Lehrs	Natural Gas	10.08	mmcf/yr	7.6	7.6	7.6	0.6	100	--	5.5	84	lb/mmcsf	0.04	0.04	0.04	0.003	0.504	--	0.03	0.42
Mold Swab - Furnace #1	Solvent	8,674	lbs of material	0.9	0.9	0.9	--	--	--	--	--	lb/lb mat	3.90	3.90	3.90	--	--	--	--	--
Mold Swab - Furnace #2	Solvent	7,929	lbs of material	0.9	0.9	0.9	--	--	--	--	--	lb/lb mat	3.57	3.57	3.57	--	--	--	--	--
Mold Swab - Furnace #3	Solvent	8,579	lbs of material	0.9	0.9	0.9	--	--	--	--	--	lb/lb mat	3.91	3.91	3.91	--	--	--	--	--
Hot End Coating - Furnace #1	TC-100	6,968	lbs of material	0.24	0.24	0.24	--	--	--	--	--	lb/lb mat	0.84	0.84	0.84	--	--	--	--	--
Hot End Coating - Furnace #2	TC-100	5,372	lbs of material	0.24	0.24	0.24	--	--	--	--	--	lb/lb mat	0.76	0.76	0.76	--	--	--	--	--
Hot End Coating - Furnace #3	TC-100	6,908	lbs of material	0.24	0.24	0.24	--	--	--	--	--	lb/lb mat	0.83	0.83	0.83	--	--	--	--	--
Furnace #1 - Mixers	Raw Materials	65,441	lbs of material	0.15	0.07	0.01	--	--	--	--	--	lb/ton	1.24	1.21	1.19	--	--	--	--	--
Furnace #2 - Mixers	Raw Materials	58,719	lbs of material	0.15	0.07	0.01	--	--	--	--	--	lb/ton	1.23	1.21	1.19	--	--	--	--	--
Furnace #3 - Mixers	Raw Materials	64,080	lbs of material	0.15	0.07	0.01	--	--	--	--	--	lb/ton	1.23	1.21	1.19	--	--	--	--	--
Total Baseline Actual Emissions													76.97	74.51	72.55	157.51	434.69	25.15	21.77	30.99

Notes:

(a) Baseline Actual Emissions of pollutants that are regulated under Prevention of Significant Deterioration (PSD) (CO, PM, PM₁₀, H₂SO₄ mist, and GHG) and Past Actual Emissions of pollutants that are regulated under Non-attainment New Source Review (NNSR) (NOx, PM_{2.5}, SO₂, and VOM) are calculated using the facility's average annual glass production rates (tons pulled) during the 24-month period from January 2010 through December 2011. Emissions are calculated using the production rate over the baseline actual / past actual period applied to the respective emission factor.

(b) Emission factors are taken from the following:

-Glass Furnaces

PM / PM₁₀ / PM_{2.5}: Emission factors for filterable PM (FPM) are based on the stack tests performed at each Furnace during the baseline period (tests conducted 9/29 - 10/1/09 and 7/28 - 7/29/11). To derive a single FPM factor for each Furnace, the factors from the stack tests are weighted based on the relative glass throughput during the period of time over the project baseline when each factor was in effect. Total PM (TPM) factor assumes that condensable PM (CPM) is 18.7% of TPM, based on 2010-2011 compliance test results for the group of similar regenerative Furnaces across SGC's fleet (producing Flint or Georgia Green glass and using 20% - 40% cullet). PM₁₀ and PM_{2.5} factors also assume that 95% of FPM is PM₁₀ and 91% of FPM is PM_{2.5}, consistent with AP-42 Table 11.15-3.

SO₂: Emission factors are based on the stack tests performed at each Furnace during the baseline period (tests conducted 9/29 - 10/1/09 and 7/28 - 7/29/11). To derive a single factor for each Furnace, the factors from the stack tests are weighted based on the relative glass throughput during the period of time over the project baseline when each factor was in effect.

NOx: Furnace 1 emission factor is based on compliance testing performed on 6/4/08, since subsequent NOx testing has not been performed on the Furnace. The Furnace 2 and 3 NOx emission factors are based on the stack tests performed at each Furnace during the baseline period (tests conducted 9/29 - 10/1/09 and 7/28 - 7/29/11). To derive a single factor for each Furnace, the factors from the stack tests are weighted based on the relative glass throughput during the period of time over the project baseline when each factor was in effect.

H₂SO₄ mist: Emission factor is derived from the average of stack testing results for the group of similar regenerative Furnaces across SGC's fleet (producing Flint or Georgia Green glass) over the 2010 - 2011 timeframe.

VOM, CO: Emission factors per AP-42, Section 11.15, Table 11.15-2, 10/86.

-Forehearts / Distributors / Lehrs

Factors from AP-42, Tables 1.4-1 and 1.4-2.

-Mold Swab, Hot End Coating

Emission factors are updated compared to those used previously in CAAPP Permit 95090177 (Conditions 7.2.12.a and 7.3.12.a) and construction permit 07050050, based on updated information regarding operations. Hot end coating factor reflects the use of C4 hoods at the Dorton facility.

- Mixers

Uncaptured emissions are calculated based on a capture efficiency of: $\frac{99\%}{10,520 \text{ cfm}}$ using the uncontrolled emission factor shown.

Captured emissions are calculated based on a total dust collector design air flow of: $\frac{0.003 \text{ g/dt}}{99\%}$ and a collector outlet grain loading of:

- Material Handling: Emissions are calculated as specified by CAAPP Permit 95090177 Condition 7.6.12.a. Emissions are based on hours of operation and will not increase as a result of the proposed project since raw material handling was operated continuously during the baseline period.

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Post-Project Emissions		383 lpd		Emission Factors ^(b)										Post-Project Emissions (TPY)							
Process	Material	Post-Project Throughput ^(a)																			
		Throughput	Unit	PM	PM ₁₀	PM _{2.5}	SO ₂	NO _x	H ₂ SO ₄ Mist	VOM	CO	EF Units		PM	PM ₁₀	PM _{2.5}	SO ₂	NO _x	H ₂ SO ₄ Mist	VOM	CO
Furnace #1	Glass	139,795	ton/yr	0.29	0.24	0.20	0.55	1.30	0.10	0.2	0.2	lb/ton		20.27	16.78	13.70	38.58	90.87	6.59	13.98	13.98
Furnace #2	Glass	102,200	ton/yr	0.33	0.28	0.24	0.81	1.30	0.10	0.2	0.2	lb/ton		16.86	14.31	12.06	41.45	66.43	5.11	10.22	10.22
Furnace #3	Glass	98,550	ton/yr	0.30	0.25	0.21	1.09	1.30	0.10	0.2	0.2	lb/ton		14.78	12.32	10.15	53.71	64.06	4.93	9.85	9.86
Furnace #1 - Forehearth / Distributors	Natural Gas	142	mmcf/yr	7.6	7.6	7.6	0.6	100	--	5.5	84	lb/mmcf		0.54	0.54	0.54	0.04	7.11	--	0.39	5.97
Furnace #2 - Forehearth / Distributors	Natural Gas	99	mmcf/yr	7.6	7.6	7.6	0.6	100	--	5.5	84	lb/mmcf		0.38	0.38	0.38	0.03	4.97	--	0.27	4.18
Furnace #3 - Forehearth / Distributors	Natural Gas	96	mmcf/yr	7.6	7.6	7.6	0.6	100	--	5.5	84	lb/mmcf		0.36	0.36	0.36	0.03	4.79	--	0.26	4.03
Material Handling	Material	4,660	lbs of Uncon PM	0.01	0.01	0.01	--	--	--	--	--	lb/lb mat		0.02	0.02	0.02	--	--	--	--	--
Furnace #1 - Lehrs	Natural Gas	14.98	mmcf/yr	7.6	7.6	7.6	0.6	100	--	5.5	84	lb/mmcf		0.06	0.06	0.06	0.004	0.749	--	0.04	0.63
Furnace #2 - Lehrs	Natural Gas	12.60	mmcf/yr	7.6	7.6	7.6	0.6	100	--	5.5	84	lb/mmcf		0.05	0.05	0.05	0.004	0.633	--	0.03	0.53
Furnace #3 - Lehrs	Natural Gas	13.82	mmcf/yr	7.6	7.6	7.6	0.6	100	--	5.5	84	lb/mmcf		0.05	0.05	0.05	0.004	0.801	--	0.04	0.58
Mold Swab - Furnace #1	Solvent	16,514	lbs of material/yr	0.9	0.9	0.9	--	--	--	--	--	lb/lb mat		7.43	7.43	7.43	--	--	--	--	--
Mold Swab - Furnace #2	Solvent	12,295	lbs of material/yr	0.9	0.9	0.9	--	--	--	--	--	lb/lb mat		5.53	5.53	5.53	--	--	--	--	--
Mold Swab - Furnace #3	Solvent	11,894	lbs of material/yr	0.9	0.9	0.9	--	--	--	--	--	lb/lb mat		5.35	5.35	5.35	--	--	--	--	--
Hot End Coaling - Furnace #1	TC-100	13,266	lbs of material/yr	0.24	0.24	0.24	--	--	--	--	--	lb/lb mat		1.59	1.59	1.59	--	--	--	--	--
Hot End Coaling - Furnace #2	TC-100	9,883	lbs of material/yr	0.24	0.24	0.24	--	--	--	--	--	lb/lb mat		1.19	1.19	1.19	--	--	--	--	--
Hot End Coaling - Furnace #3	TC-100	9,467	lbs of material/yr	0.24	0.24	0.24	--	--	--	--	--	lb/lb mat		1.14	1.14	1.14	--	--	--	--	--
Furnace #1 - Mixers	Raw Materials	124,584	lbs of material/yr	0.15	0.07	0.01	--	--	--	--	--	lb/ton		1.28	1.23	1.19	--	--	--	--	--
Furnace #2 - Mixers	Raw Materials	91,070	lbs of material/yr	0.15	0.07	0.01	--	--	--	--	--	lb/ton		1.25	1.22	1.19	--	--	--	--	--
Furnace #3 - Mixers	Raw Materials	87,830	lbs of material/yr	0.15	0.07	0.01	--	--	--	--	--	lb/ton		1.25	1.22	1.19	--	--	--	--	--
Emergency Generator	Diesel fuel	750	kW	0.20	0.20	0.20	0.00738	6.4	--	1.3	3.5	g/kW-hr		0.08	0.08	0.08	0.003	2.65	--	0.54	1.45
Scrubber Silo	Particulate	1,214	1,000 lb material/yr	0.0036	0.0036	0.0036	--	--	--	--	--	lb/1,000 lb		0.002	0.002	0.002	--	--	--	--	--
ESP Dust Silo	Particulate	2,545	1,000 lb material/yr	0.0036	0.0036	0.0036	--	--	--	--	--	lb/1,000 lb		0.005	0.005	0.005	--	--	--	--	--
Total Post-Project Emissions:														79.49	70.85	63.27	133.85	242.95	17.03	35.63	51.42

Notes:

(a) Post-project emissions of pollutants that are regulated under Prevention of Significant Deterioration (PSD) (CO, PM, PM₁₀, H₂SO₄ mist, and GHG) are future Projected Actual Emissions after the project.

Post-project emissions of pollutants that are regulated under Non-attainment New Source Review (NNSR) (NO_x, PM_{2.5}, SO₂, and VOM) are future Permitted Emissions.

(b) Post-Project emission factors are taken from the following:

-Glass Furnace

PM / PM₁₀ / PM_{2.5}: Post-project emission factors for filterable PM (FPM) from each Furnace are based on the GCD limit [IV.9.c]. Total PM (TPM) factor assumes that CPM is 31% of TPM for Furnace #1, 39.4% of TPM for Furnace #2, and 33.3% of TPM for Furnace #3, conservatively assuming that CPM emissions remain unchanged from the results of the most recent stack tests. PM₁₀ and PM_{2.5} factors also assume that 75% of FPM is FPM₁₀ and 53% of FPM is FPM_{2.5}, consistent with AP-42 Table 11.15-3 for an ESP-controlled Furnace.

SO₂: Post-project emission factors are based on the GCD limit of 50 ppm (for a pre-control SO₂ concentration less than 167 ppmv) and on the expected performance of the dry scrubber to be installed as part of the proposed project, given the expected inlet SO₂ concentrations at each Furnace taken from the most recent stack test results.

NO_x: As specified by GCD, IV.7.d.ii.

H₂SO₄ mist: Post-project emission factor is based on recent stack testing results of other SGCI Furnaces with SO₂ controls while accounting for expected variability of Furnace operation.

VOM, CO: Factors from AP-42, Table 11.15-2.

-Forehearth / Distributor / Lehr

Factors from AP-42, Tables 1.4-1 and 1.4-2.

-Mold Swab, Hot End Coaling

Emission factors are updated compared to those used previously in CAAPP Permit 95090177 (Conditions 7.2.12.a and 7.3.12.a) and construction permit 07050050, based on updated information regarding operations. Hot end cooling factor reflects the use of C4 hoods at the Dillon facility.

-Mixers

Uncaptured emissions are calculated based on a capture efficiency of: $\frac{99\%}{10,520 \text{ cfm}}$ using the uncontrolled emission factor shown.

Captured emissions are calculated based on a total dust collector design air flow of: $\frac{0.003 \text{ g/grc}}{0.003 \text{ g/grc}}$

-Material Handling: Emissions are calculated as specified by CAAPP Permit 95090177 Condition 7.5.12.a. Emissions are based on hours of operation and will not increase as a result of the proposed project since raw material handling was operated continuously during the baseline period.

-Scrubber Silo and ESP Silo

Emission factors from AP-42, Table 11.26-1 for storage bin loading. Factors conservatively assume PM = PM₁₀ = PM_{2.5}.

-Emergency Generator

PM, NO_x, VOC, and CO factors are based on the allowable limits for Tier 2 engines according to 40 CFR 60.4202(a)(2). NO_x factor is based on the NMHC + NO_x limit; VOM factor is based on the Tier 1 allowable limit for HC; SO₂ factor taken from AP-42 Table 3.4-1. Factor assumes use of diesel fuel with 15 ppm sulfur content, and conversion factor of 0.668 kg/kW-hr / lb/hp-hr per Note (a) of AP-42 Table 3.4-1. Emissions assume an annual engine runtime of: $\frac{500 \text{ hr/yr}}{500 \text{ hr/yr}}$, consistent with USEPA memo "Calculating Potential to Emit for Emergency Generators" (September 8, 1995).

ENVIRONSaint-Gobain Containers, Inc.
Dolton Furnace #1 & #2 & #3 Modifications
Baseline Actual CO₂e Emission CalculationsSignature: MMW
Checked by: JGB/BEDDate Calc Made Final: 9/13/2012
Page: 15**BASELINE ACTUAL GHG EMISSIONS CALCULATIONS**Furnace CO₂e = 51,131.87Subpart C Tier 1 CO₂ Calculation Methodology (Eq. C-1),CO₂ = 1x10⁻³ * Fuel * HHV * EF

Natural Gas

CO ₂ =	42,193.49	metric tons	
Fuel =	774,127,785	scf	(based on annual average actual NG usage during baseline period)
HHV =	1.028E-03	MMBtu/scf	(default value from Table C-1)
EF =	53.02	kg CO ₂ /MMBtu	(default value from Table C-1)

Subpart C CH₄ and N₂O Calculation Methodology (Eq. C-8)CH₄ or N₂O = 1x10⁻³ * Fuel * HHV * EFCO₂e = Emissions in metric tons/yr * Global Warming Potential

Natural Gas

CH ₄ =	0.80	metric tons	
CO ₂ e for CH ₄ =	16.71	metric tons	GWP _{CH₄} = 21
N ₂ O =	0.08	metric tons	
CO ₂ e for N ₂ O =	24.67	metric tons	GWP _{N₂O} = 310
Fuel =	774,127,785	scf	(based on annual average actual NG usage during baseline period)
HHV =	1.028E-03	MMBtu/scf	(default value from Table C-1)
EF _{CH₄} =	1.00E-03	kg CH ₄ /MMBtu	(default value from Table C-2)
EF _{N₂O} =	1.00E-04	kg N ₂ O/MMBtu	(default value from Table C-2)

Subpart N CO₂ Calculation Methodology for Use of Carbonate-Based Raw MaterialsFor purposes of estimating baseline emissions, the CO₂ emissions are calculated using the average usage of each carbonate-based material charged to each furnace over the baseline period.E_{CO₂} = 8,897 metric tons

Eq. N-1

$$E_{CO_2} = \sum_{i=1}^n MF_i * \left(M_i * \frac{2000}{2205} \right) * EF_i * F_i$$

Where:

E_{CO₂} = Process emissions of CO₂ from the furnace (metric tons)

n = Number of carbonate-based raw materials charged to the furnace

Annual average mass fraction of carbonate-based mineral "i" in carbonate-based raw material "i" (percentage, expressed as a decimal)

MF_i = NOTE: a value of 1.0 can be used as an alternative to data provided by the raw material supplier.M_i = Annual amount of carbonate-based raw material "i" charged to furnace (tons)

2000/2205 = Conversion factor to convert tons to metric tons

EF_i = Emission factor for carbonate-based raw material "i", (metric ton CO₂ per metric ton carbonate-based raw material as shown in Table N-1 to Subpart N)F_i = Fraction of calcination achieved for carbonate-based raw material "i", assume to be equal to 1.0 (percentage, expressed as a decimal)

Raw Material	CO ₂ Emission Factor (metric tons CO ₂ /metric ton material)	Tons/Year Charged to Furnace #1	Tons/Year Charged to Furnaces #2	Tons/Year Charged to Furnaces #3
Limestone- CaCO ₃	0.440	10,473	9,640	10,192
Dolomite- CaMg(CO ₃) ₂	0.477	0	0	0
Sodium-carbonate/ soda ash-Na ₂ CO ₃	0.415	12,532	11,486	12,144

The mass fraction of carbonate-based mineral in the raw material (MF_i) was conservatively assumed to be 100% to estimate emissions.

* Average annual usage during baseline period.

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Saint-Gobain Containers, Inc.
 Dolton Furnace #1 & #2 & #3 Modifications
 Baseline Actual CO₂e Emission Calculations

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Distributor/Facility/Lehrs CO₂e = 12,817.80

Subpart C Tier 1 CO₂ Calculation Methodology (Eq. C-1)

$$\text{CO}_2 = 1 \times 10^{-3} \times \text{Fuel} \times \text{HHV} \times \text{EF}$$

Natural Gas

CO ₂ =	12,805.35	metric tons	
Fuel =	234,940,804	scf	(based on annual average actual NG usage during baseline period)
HHV =	1.028E-03	MMBtu/scf	(default value from Table C-1)
EF =	53.02	kg CO ₂ /MMBtu	(default value from Table C-1)

Subpart C CH₄ and N₂O Calculation Methodology (Eq. C-8)

$$\text{CH}_4 \text{ or N}_2\text{O} = 1 \times 10^{-3} \times \text{Fuel} \times \text{HHV} \times \text{EF}$$

$$\text{CO}_2\text{e} = \text{Emissions in metric tons/yr} \times \text{Global Warming Potential}$$

Natural Gas

CH ₄ =	0.24	metric tons	
CO ₂ e for CH ₄ =	5.07	metric tons	GWP _{CH4} = 21
N ₂ O =	0.02	metric tons	
CO ₂ e for N ₂ O =	7.49	metric tons	GWP _{N2O} = 310
Fuel =	234,940,804	scf	(based on annual average actual NG usage during baseline period)
HHV =	1.028E-03	MMBtu/scf	(default value from Table C-1)
EF _{CH4} =	1.00E-03	kg CH ₄ /MMBtu	(default value from Table C-2)
EF _{N2O} =	1.00E-04	kg N ₂ O/MMBtu	(default value from Table C-2)

	Saint-Gobain Containers, Inc. Dolton Furnace #1 & #2 & #3 Modifications Projected Actual CO ₂ e Emission Calculations
Signature: <i>MMW</i> Checked by: <i>JGB/BED</i>	Date Calc Made Final: 9/13/2012 Page: 17

PROJECTED ACTUAL GHG EMISSIONS CALCULATIONS

Furnace CO₂e = 85,803.13

Subpart C Tier 1 CO₂ Calculation Methodology (Eq. C-1)

CO₂ = $1 \times 10^{-3} \times \text{Fuel} \times \text{HHV} \times \text{EF}$

Natural Gas

CO ₂ =	68,803.18	metric tons	
Fuel =	1,262,338,139	scf	(based on projected actual annual production)
HHV =	1.028E-03	MMBtu/scf	(default value from Table C-1)
EF =	53.02	kg CO ₂ /MMBtu	(default value from Table C-1)

Subpart C CH₄ and N₂O Calculation Methodology (Eq. C-8)

CH₄ or N₂O = $1 \times 10^{-3} \times \text{Fuel} \times \text{HHV} \times \text{EF}$

CO₂e = Emissions in metric tons/yr * Global Warming Potential

Natural Gas

CH ₄ =	1.30	metric tons	
CO ₂ e for CH ₄ =	27.25	metric tons	GWP _{CH₄} = 21
N ₂ O =	0.13	metric tons	
CO ₂ e for N ₂ O =	40.23	metric tons	GWP _{N₂O} = 310
Fuel =	1,262,338,139	scf	(based on projected actual annual production)
HHV =	1.028E-03	MMBtu/scf	(default value from Table C-1)
EF _{CH₄} =	1.00E-03	kg CH ₄ /MMBtu	(default value from Table C-2)
EF _{N₂O} =	1.00E-04	kg N ₂ O/MMBtu	(default value from Table C-2)

Subpart N CO₂ Calculation Methodology for Use of Carbonate-Based Raw Materials

For purposes of projected actual GHG emissions for the facility, the CO₂ emissions are calculated using the projected usage of each carbonate-based material charged to each furnace in a year.

E_{CO₂} = 18,937 metric tons

Eq. N-1

$$E_{CO_2} = \sum_{i=1}^n MF_i * \left(M_i * \frac{2000}{2205} \right) * EF_i * F_i$$

Where:

E_{CO₂} = Process emissions of CO₂ from the furnace (metric tons)

n = Number of carbonate-based raw materials charged to the furnace

Annual average mass fraction of carbonate-based mineral "i" in carbonate-based raw material "i" (percentage, expressed as a decimal)

MF_i = NOTE: a value of 1.0 can be used as an alternative to data provided by the raw material supplier.

M_i = Annual amount of carbonate-based raw material "i" charged to furnace (tons)

2000/2205 = Conversion factor to convert tons to metric tons

EF_i = Emission factor for carbonate-based raw material "i", (metric ton CO₂ per metric ton carbonate-based raw material as shown in Table N-1 to Subpart N)

F_i = Fraction of calcination achieved for carbonate-based raw material "i", assume to be equal to 1.0 (percentage, expressed as a decimal)

Raw Material	CO ₂ Emission Factor (metric tons CO ₂ /metric ton material)	Tons/Year Charged to Furnace #1	Tons/Year Charged to Furnaces #2	Tons/Year Charged to Furnaces #3
Limestone- CaCO ₃	0.440	19,938	14,951	13,968
Dolomite- CaMg(CO ₃) ₂	0.477	0	0	0
Sodium-carbonate/ soda ash-Na ₂ CO ₃	0.415	23,857	17,814	16,642

The mass fraction of carbonate-based mineral in the raw material (MF_i) was conservatively assumed to be 100% to estimate emissions.

* Projected annual usage based on baseline usage x projected glass pull rate/baseline annual average glass pull rate.

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Saint-Gobain Containers, Inc.
Dolton Furnace #1 & #2 & #3 Modifications
Projected Actual CO₂e Emission Calculations

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Distribution/Facilities/Lehrs CO₂e = 20,660.72

Subpart C Tier 1 CO₂ Calculation Methodology (Eq. C-1)

CO₂ = $1 \times 10^{-3} \cdot \text{Fuel} \cdot \text{HHV} \cdot \text{EF}$

Natural Gas

CO ₂ =	20,660.45	metric tons	
Fuel =	379,059,160	scf	(based on projected actual annual production)
HHV =	1.028E-03	MMBtu/scf	(default value from Table C-1)
EF =	53.02	kg CO ₂ /MMBtu	(default value from Table C-1)

Subpart C CH₄ and N₂O Calculation Methodology (Eq. C-8)

CH₄ or N₂O = $1 \times 10^{-3} \cdot \text{Fuel} \cdot \text{HHV} \cdot \text{EF}$

CO₂e = Emissions in metric tons/yr * Global Warming Potential

Natural Gas

CH ₄ =	0.39	metric tons	
CO ₂ e for CH ₄ =	8.18	metric tons	GWP _{CH₄} = 21
N ₂ O =	0.04	metric tons	
CO ₂ e for N ₂ O =	12.08	metric tons	GWP _{N₂O} = 310
Fuel =	379,059,160	scf	(based on projected actual annual production)
HHV =	1.028E-03	MMBtu/scf	(default value from Table C-1)
EF _{CH₄} =	1.00E-03	kg CH ₄ /MMBtu	(default value from Table C-2)
EF _{N₂O} =	1.00E-04	kg N ₂ O/MMBtu	(default value from Table C-2)

Soda Ash Scrubbing CO₂e = 229

Subpart C Calculation Methodology for CO₂ from Sorbent (Eq. C-11)

CO₂ = $0.91 \cdot \text{Sorbent Use} \cdot R \cdot [\text{MW}_{\text{CO}_2} / \text{MW}_{\text{sorbent}}]$

Soda Ash Scrubbing of SO₂

CO ₂ =	229	metric tons	
Sorbent Use =	607	ton/yr	(based on projected actual annual production)
R =	1.0	[mol CO ₂ released / mol SO ₂ captured]	
MW _{CO₂}	44		
MW _{Na₂CO₃}	105.99		

New emergency generator CO₂e = 95

Subpart C Tier 1 CO₂ Calculation Methodology (Eq. C-1b)

CO₂ = $1 \times 10^{-3} \cdot \text{Fuel} \cdot \text{EF}$

Diesel

CO ₂ =	95	metric tons	
Fuel =	1,280	MMBtu	(based on projected actual annual production)
EF =	73.95	kg CO ₂ /MMBtu	(default value from Table C-1)

Subpart C CH₄ and N₂O Calculation Methodology (Eq. C-8b)

CH₄ or N₂O = $1 \times 10^{-3} \cdot \text{Fuel} \cdot \text{EF}$

CO₂e = Emissions in metric tons/yr * Global Warming Potential

Diesel

CH ₄ =	0.00384	metric tons	
CO ₂ e for CH ₄ =	0.08	metric tons	GWP _{CH₄} = 21
N ₂ O =	0.00077	metric tons	
CO ₂ e for N ₂ O =	0.24	metric tons	GWP _{N₂O} = 310
Fuel =	1,280	MMBtu	(based on projected actual annual production)
EF _{CH₄} =	3.00E-03	kg CH ₄ /MMBtu	(default value from Table C-2)
EF _{N₂O} =	6.00E-04	kg N ₂ O/MMBtu	(default value from Table C-2)

Application for Construction Permit

Appendix C

Approval of Request to Use Alternative Control Technology

ENVIRON